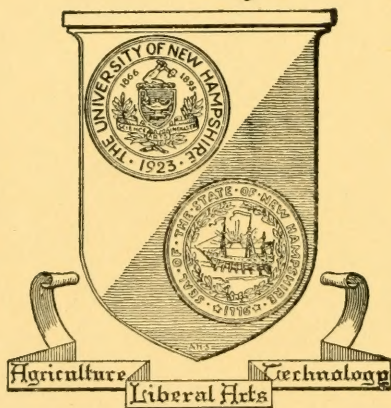
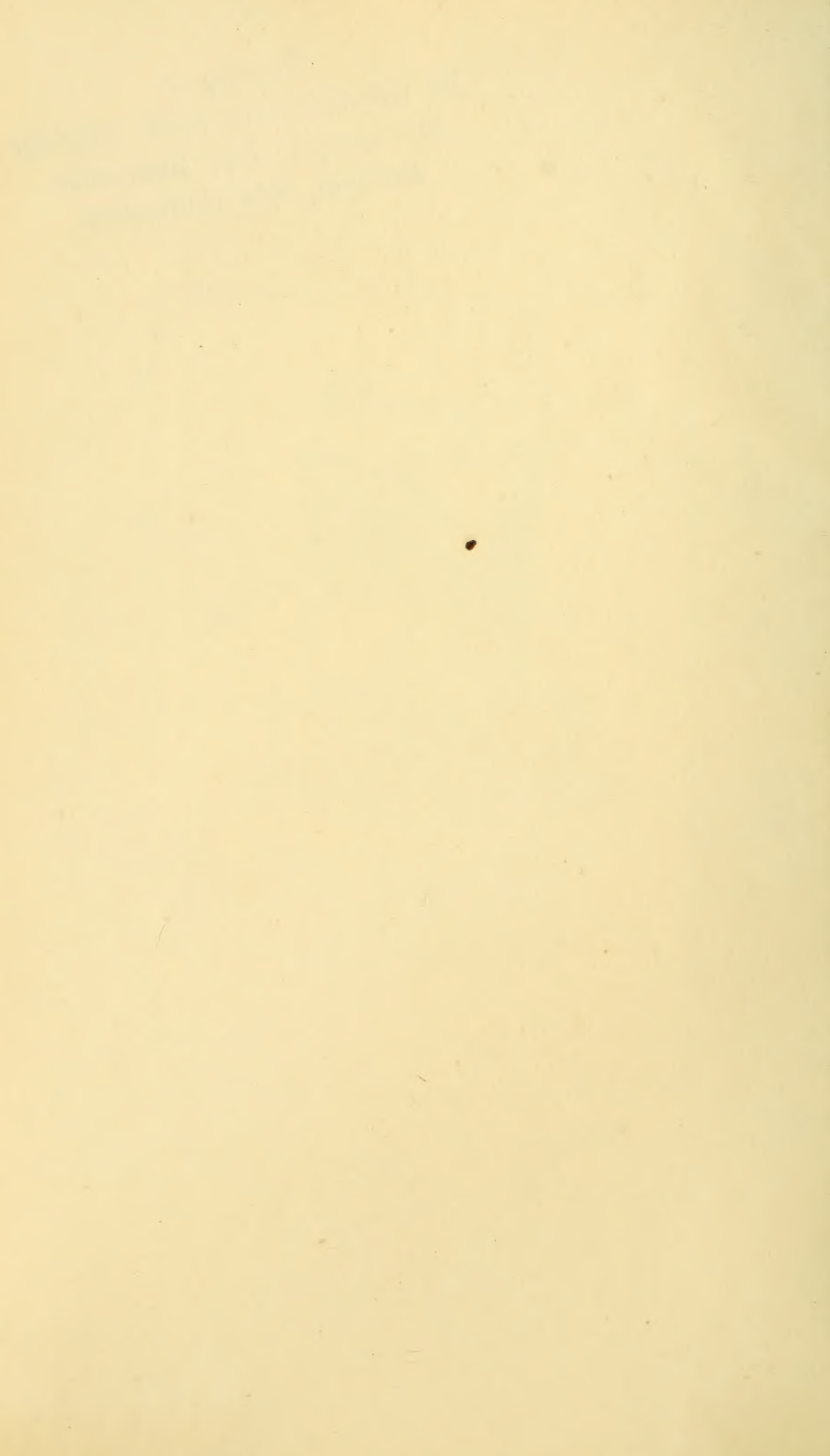


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STATE
OF
NEW HAMPSHIRE.

ANNUAL REPORTS,

1891.

VOL. II.

CONCORD:
IRA C. EVANS, PUBLIC PRINTER.
1892.

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R E P O R T

OF THE

ADJUTANT-GENERAL

OF THE

STATE OF NEW HAMPSHIRE

NOVEMBER 1, 1890, TO OCTOBER 31, 1891.

BEING

VOLUME III, PART II.

AYLING'S REPORTS.

CONCORD:

IRA C. EVANS, PUBLIC PRINTER.

1891.

ADJUTANT-GENERAL'S REPORT.

STATE OF NEW HAMPSHIRE.

ADJUTANT-GENERAL'S OFFICE,

CONCORD, October 31, 1891.

His Excellency Hiram A. Tuttle, Governor and Commander-in-Chief, and the Honorable Council:

GENTLEMEN,— I have the honor to present herewith my annual report for the year ending October 31, 1891, with accompanying papers.

Comparatively few changes among companies have occurred during the year. In the First Regiment, Company C, Goffstown, was disbanded April 4, 1891, and the property transferred on the same date to Manchester, where a company had been organized to fill the vacancy. In the Second Regiment, Company K, Hillsborough Bridge, was disbanded December 30, 1890, and a new company organized in its place, at Nashua, March 18, 1891.

A new company was also placed in Milford, January 27, 1891, to fill the vacancy in the regiment caused by the disbandment of Company D, of Newport, last year.

At the time of my last report the Third Regiment had but six companies, there being two vacancies. One of these has been filled by the organization of a company at Concord, April 14, 1891, designated as Company E, and taking the place of the Plymouth Company.

The Cavalry and Artillery remain as heretofore, with full ranks and in a high state of efficiency. I am satisfied that it is useless to attempt to retain prosperous and efficient companies in the smaller towns. There are a few notable exceptions, but as a rule, I think it much better to place companies, so far as possible, in the cities and large centers, where there is more available material with which to keep the ranks full, and where in case of necessity the men could be more easily and quickly assembled, and moved to any required point.

The aggregate strength of the New Hampshire National Guard is 118 officers, and 1,121 enlisted men, organized as a brigade, consisting of the First Regiment Infantry, eight companies; Second Regiment Infantry, eight companies; Third Regiment Infantry, seven companies; First Battery; and Troop A, Cavalry.

UNIFORMS AND EQUIPMENTS.

The dress uniforms issued nearly four years ago, are generally in good condition, a few coats and trousers may have to be purchased occasionally to fill requisitions for extra sizes, but there should be no necessity for any great outlay for clothing for several years to come.

Last spring, regulation blouses, forage caps, and white cork helmets, drawn from the Quartermaster's Department of the United States, were issued to the entire command in time for use at the encampment, and apparently were appreciated by the troops who have been obliged heretofore to purchase their own fatigue uniforms, if they had them at all.

White plumes and helmet cords have also been drawn and issued to the regimental bands, and all commissioned officers have been furnished with the regulation service belt for undress use.

The overcoats now in use are of the old war time pattern, and many of them are badly worn and soiled, but by replacing the worst of these from the supply on hand in the arsenal they can be made to last another year or two.

The cartridge boxes holding but twenty rounds are also obsolete and worn, and the McKeever, or some other serviceable box, should be drawn from the Ordnance Department to replace them so soon as practicable.

The rifles are mostly in serviceable condition. It is probable that a new rifle of smaller calibre will soon be adopted by the Government for the regular army, in which case an effort should be made to obtain a supply of the new arms in exchange for those now in use by the State. Bayonet scabbards and waist belts are in excellent condition, and I have on hand a supply sufficient to last four or five years.

ENCAMPMENT AND GENERAL REMARKS.

The encampment for 1890 was for but five days, commencing June 23, the financial condition of this department not permitting a longer tour of duty.

Next year it is to be hoped that not less than a full week may be devoted to camp duties.

Your Excellency, accompanied by the staff, went into camp June 24, remaining until the evening of the 26th, upon which day the brigade was reviewed by you. I am confident that your stay in camp was received by the troops as evidence of your interest in them and as such fully appreciated.

The encampment was honored on the 26th, by the presence of Hon. Redfield Proctor, Secretary of War; Governor Carroll S. Page, of Vermont; and other dis-

tinguished guests, who were properly escorted to camp, and received with the appropriate honors.

For the details of the encampment and the opinion of the United States Inspecting Officer, and of the Inspector General of the State, as to the drill, discipline, and general efficiency of the brigade, I respectfully refer you to the reports of Col. Loomis L. Langdon, First Artillery, U. S. A., and Brig. Gen. Albert N. Dow, Inspector General, which accompany this.

I also respectfully call your attention to General Dow's report of the armory inspection, and to the report of Maj. H. B. Cilley, Brigade Inspector of Rifle Practice for the season of 1890. As the practice season does not close until November 30, I am unable at this time to give the report of rifle practice for the season of 1891, but from what I have learned I am satisfied that excellent progress has been made.

The new drill regulations which have been for a long time in preparation by a board of officers, appointed by the Secretary of War, have been approved and adopted for the regular army. I have made application for a sufficient number to supply the state troops and as soon as received they will be issued to replace the "Upton's Tactics" now in use.

Pursuant to an act of the Legislature, approved March 18, 1891, a detail of three companies was made from the New Hampshire National Guard to represent the State at the dedication of the "Battle Monument" at Bennington, Vermont, August 19.

The companies were selected from the best in each of the three regiments, as reported by the Inspector General, and were as follows:

Company H, First Regiment, Manchester, Capt. J. Soly.

Company G, Second Regiment, Keene, Capt. E. O. Upham.

Company C, Third Regiment, Concord, Capt. W. C. Trenoweth.

Maj. Francis O. Nims, Second Regiment, was detailed as battalion commander, with the following staff:

Adjutant, Frank B. Perkins, First Regiment.

Quartermaster, Arthur M. Dodge, Third Regiment.

Assistant Surgeon, Robert Burns, Third Regiment.

Sergeant Major, Edward S. Cook, Third Regiment.

Quartermaster Sergeant, George E. Danforth, Second Regiment.

Drum Major, Francis H. Pike, First Regiment.

The Third Regiment Band was designated as the band of the battalion.

The Governor and Commander-in-Chief was present accompanied by his staff, and, by his invitation, the Amoskeag Veterans, Maj. Charles H. Bartlett, commanding, attended as his special escort.

The Honorable Council; the Secretary of State; State Treasurer; Hon. J. H. Gallinger, U. S. Senator; the Brigade Commander and Staff; the Board of Managers of the Soldiers' Home; representatives of the Press; and other gentleman accompanied the party, also upon the invitation of the Governor.

The battalion and escort made a fine appearance upon parade, and were an honor to the State which they represented.

The work of revising and preparing the records of New Hampshire soldiers and sailors of the war has made such progress that I think it will be finished during the next spring.

The following reports and papers are respectfully forwarded for your information:

Reports of Inspector-General.

Armory Inspections.

Encampment 1890.

Report of Col. Loomis L. Langdon, First Artillery,
U. S. A.

Report of Maj. Harry B. Cilley, Inspector of Rifle
Practice, with list of marksmen and sharpshooters for
season of 1890.

Return of the New Hampshire National Guard with
location and strength of each organization.

Register of commissioned officers October 31, 1891.

Resignations and discharges of commissioned officers
during the year.

Commissions issued during the year.

Enlisted men dropped as deserters during the year.

I desire in closing my report to express my appreciation of the courtesy and consideration with which I have been treated in my official intercourse with Your Excellency and the members of your Executive Council.

Very respectfully,

Your obedient servant,

A. D. AYLING,

Adjutant-General.

REPORTS OF INSPECTOR-GENERAL.

STATE OF NEW HAMPSHIRE.

INSPECTOR-GENERAL'S OFFICE,

EXETER, July 27, 1891.

GEN. A. D. AYLING,

Adjutant-General, Concord:

Sir,—I have the honor herewith to report the result of the inspection of the First Brigade, N. H. N. G., as ordered in G. O. No. 3, par. 1, c. s. Maj. Charles E. Faxon, A. I. G., reported to me by letter for instructions, but was unfortunately taken sick, and was not able to render the assistance which he desired, and which I should have been very glad to have received. Inspections were made in about the same manner as heretofore. The ceremony of inspection came first; after this a drill by card; then short squad drills by the non-commissioned officers; this was followed by an examination in guard duty.

In some companies reliefs were posted, and Captains asked to demonstrate their methods of instruction. The inspections averaged about one hour and three quarters to each company. When it was possible, I visited armories in the afternoon, and examined property by daylight. Four new companies have been organized since the last inspection. Two in the Second Infantry, and one each in the First and Third. Company K, Nashua, takes the place of the company formerly at Hillsborough Bridge; Company D, Milford, that of the Newport Company; Company C, Manchester, that of

the company formerly at Goffstown, and Company E, Concord, the place of the one formerly at Plymouth.

The strength of the Brigade at the time of the inspection is shown in the table below, also the percentage of attendance.

	TOTAL FORCE AT DATE OF INSPECTION.			ABSENT.		Percentage of attendance.	Percentage of attendance, 1890.	Enlisted since last inspection.
	Officers.	Men.	Aggregate.	Officers.	Men.			
Brigade Commander and Staff	10	4	14	0	0	100	100	
Artillery.....	4	69	73	0	7	90	100	5
Cavalry.....	3	56	59	0	6	89	96	6
First Infantry.....	27	341	368	0	16	95	86	169
Second Infantry.....	32	354	386	1	21	94	90	178
Third Infantry.....	30	294	324	2	48	84	78	145
	106	1,118	1,224	3	98	91	86	503

It will be seen by the table that there has been a gain in percentage of attendance in each of the Infantry organizations, the most noticeable being in the First. There has also been a falling off in the percentage of the Cavalry and Artillery. The aggregate percentage of attendance is considerably better than last year, as is shown. The number of enlistments as here given, does not include non-commissioned staff officers, or members of the bands, so it will be seen that very nearly 50 per cent of the men inspected were new men.

Inspections being made by roster, the Second Regiment came first, followed by the Third, then the First.

SECOND INFANTRY.

Company E, Rochester. It will be remembered that this company was suffering last year on account of a dullness in the shoe business, which had obliged many of the members to leave town. The company is not yet in stable equilibrium, but there is now no lack of material. The Captain says he has had more applications for membership than he could accommodate. This is encouraging, as men do not seek admission to a company not fairly prosperous. The company was handicapped at the inspection by the presence of twenty-seven recruits, out of the thirty-seven men present. The most urgent need of the company is an armory. While the present quarters may be said to be secure, they are far from being satisfactory; the room being open to the elements in several places. The uniforms and equipments are now kept at the armory, but the arms have been removed to rooms recently secured close by. The prospect is better than it appeared to be last year and better than the table of comparative standing will indicate.

Company F, Farmington, was found in its usual good condition. The material is good, and the officers are efficient. Too little time has been devoted to guard duty; this seems to be the company's weakest point. I believe the inspection was an improvement over that of last year.

Companies C, I, and K, Nashua, were all inspected on the same evening. The inspection of Company K was informal, and no drill was called for. Its quarters are in the new armory with Companies C and I.

If one may judge from this superficial view, the material of the officers and men is better than the average, and there is no doubt that an efficient company

will soon be developed. Companies C and I have reached a high state of efficiency, and deserve the accommodations which they possess, and which are the most complete of any in the State. Company C is not doing what it should in rifle practice ; this is its weakest point.

Companies G and H, Keene. The inspection proper of these two companies was made as a battalion, after which each company was drilled separately. The whole performance was remarkably free from errors, on the part of officers and men. Such a showing could not have been made except by hard work, and intelligent direction. The greatest harmony prevails between the two companies ; in fact they are practically one company, each interested in the other's welfare as well as its own ; this must be one of the secrets of the extraordinary success which has been attained. I can make no accurate statement comparative with former standing, but it is safe to say that the battalion is sustaining its past reputation, and that is certainly gratifying.

Company D, Milford, was organized on the twenty-sixth of last January, and consequently not so much could be expected, as from the older companies. The town gives the use of the town hall one night in each week, free of charge. It also gives the use of an upper room in the same building, for the arms, equipments, and other property. The property room is too small for the purpose, but the accommodations as a whole are better than those of most country companies. There is reason to expect a good company here, as most of the conditions for a successful one are present—good material, suitable quarters, and the support of the leading citizens of the town.

THIRD INFANTRY.

Company D, Pittsfield. Last year the company was handicapped by the loss of material caused by a dullness in the shoe business, from which most of the men are recruited. Material this year is abundant, and can be depended upon. The company has doubtless made some progress since last year, but it should not rest satisfied with its present condition, for a higher standard could easily be reached.

Company C, Concord. Since the last inspection the company has moved into new quarters in the City Hall building, using the large hall for a drill room, and an upper room for property. These quarters are convenient, and the drill room commodious. The company was handicapped like several of the others at the inspection, by the presence of a large number of recruits, so that the ceremony and drill were not so smooth as they might otherwise have been, perhaps as they should have been. It is hoped that with the new quarters, and with the development of the new material, progress will be made. After the inspection a prize drill was held, in the manual of arms. Private W. C. Hammond won the gold medal, which the winner is entitled to hold until the next annual competition.

Company E, Concord. The inspection of this company was necessarily very informal, as it had only recently been organized. No drill was called for. The company is quartered in the same building with Co. C, and has similar accommodations. It is composed of bright young men, many of whom have had experience as High School Cadets. The members average much smaller and younger than other companies, but it is hoped that youthful enthusiasm will more than make amends for these deficiencies.

Company G, Lebanon. The armory here is not entirely satisfactory in its present condition, but can be made so in a short time at small expense. The roof not being tight, in times of heavy rains the arms have to be moved to the driest spots. The quarters in other respects are fairly good. It has heretofore been customary to allow each man to keep his dress uniform at home, but lockers are now being made, and very soon property will all be under one roof, and the eye of the Captain. This is as it should be, but as it is not in many companies. The company is obliged to draw its membership from a large territory. Under the circumstances the prospects are encouraging, for there is no doubt that the company is on a more substantial basis than last year.

Company A, New London, has changed commanders since last year. It labors under the disadvantage of being obliged to draw its members from a territory larger than that of any company in the force except the Cavalry. The inspection as a whole was creditable, though there is still a large opportunity for improvement.

Company H, Franklin, has changed commanders since last year, Captain Cheever having been promoted to Major. The company under Captain Ripley passed its usual good inspection, notwithstanding there were a large number of recruits present. There is not at present a suitable place for keeping the uniforms; it having been necessary for some time to keep them packed in boxes. Steps have been taken to secure extra room, where property may be more conveniently, and safely kept. The Captain reports more applications for enlistment than can be accommodated, and there is now a large waiting squad, which drills regularly.

Company F, Bristol. The natural tendencies here have been downward for a long time, and recently the natural tendencies appear to have had it all their own way. The average attendance at drills has been about half-a-dozen, and sometimes the number has been reduced to one officer. The drill showed very little knowledge of the movements in the school of the company, on the part of the men. Believing the condition of the company to be far below what the State demands, I deemed it my duty to say that the company would be disbanded, unless steps were immediately taken towards a reorganization or readjustment of the difficulties which I believe were correctly located. At an after meeting following the inspection, Colonel Sanborn arranged to call a meeting within a few days to nominate a captain. It seems as if an efficient company might still exist here, as there appears to be material. If the change contemplated does not result in a material change for the better, I would recommend the disbandment of the company. I am inclined to think that this change will bring the company to its feet again.

FIRST INFANTRY.

Company F, Derry, has successfully passed a crisis, and is convalescent. The company at the inspection was practically a new one. The Captain had been in command but a short time, yet considerable work had already been accomplished. The company is chiefly composed of shoemakers, who are here, as everywhere, an unstable population. The present material appears to be good, and the officers ambitious. I am informed that the company now has the support of the leading citizens. There seems to be no reason why there

should not be a good company here, and from what was seen and heard, I think this may be expected.

Company C, Manchester, has secured a property room, but as yet has no drill room; what drilling had been done previous to the inspection, had been done out of doors. The company paraded under command of its First Lieutenant; Captain Cheever, who was first chosen commander, having resigned on account of poor health. No drill was called for by card, but a few movements were executed which showed considerable proficiency, considering the short time since the organization. The company starts with good prospects, and if it continues with the spirit which it has already shown, we shall soon hear good reports from it.

Company K, until recently has been known as one of the best, and one of the most prosperous financially, but its prosperity nearly proved its ruin. The division of the company fund, which had reached the sum of nearly two thousand dollars, created troubles which were finally settled in court. These difficulties caused the loss of many of the best men, so that, at the time of the inspection, the company was comparatively a new one. The inspection was creditable under the circumstances. All who know Captain O'Malley, and what he has accomplished while he has been in the service, will not doubt that his company will soon reach its former standard.

Company E, is holding its own. Credit is especially due for knowledge of guard duty, and condition of records.

Company B, has at last secured an armory, and is better off in respect to quarters than it has been for nearly two years, during which time it has had no home; yet the present quarters are very unsatisfactory.

The company plainly shows the good results of the "setting up drill." Men were well set up, and steady during the ceremony. Movements were executed with precision and snap. The company is evidently prospering.

Company H. This inspection was among the best. Men were well set up, and remarkably steady. The carriage on the march was soldierly; distances well preserved, and movements clean and accurate. Captain Soly and his subordinates deserve a good deal of credit for what they have accomplished in so short a time.

Company A, Dover. The inspection was not so smooth or free from errors as that of last year, but was gratifying as it always is in this command. The material is probably as good as there is in the force, and this, together with the fact that the officers are efficient, accounts for the uniform excellence of the inspections in this company.

Company D, Dover, although not doing so much as it might do, appears to be prosperous, and I believe has made progress since last year. The Signal Detachment connected with the company, was informally inspected after the company. Communication was established between two stations. Flags were well handled, and messages accurately sent and received. The detachment in its present shape is a credit to Captain Sawyer in whose charge it is, but the number is too small for an efficient detachment. Double the present number would be better suited to our needs.

This branch of the work merits more attention than it has yet received, for there will doubtless be work for signal men when troops are called out.

FIRST BATTERY.

The usual inspection was made in the upper hall, of arms, equipments, and uniforms, after which all the men were questioned in guard duty; this was followed by a drill in the gun room, in the manual of the piece, and such movements as could be executed in the limited space. The results proved the Battery to be sustaining its reputation, and to say that is to compliment it.

A good deal of hard work doubtless is done, and must be done to maintain the high standard which has been reached here, for there is no rest; hard work is as necessary to maintain a high standard as to attain it. Commendation is due for its knowledge of guard duty; all the more creditable, from the fact that the men have never been called on for camp guard duty.

TROOP A, CAVALRY.

The inspection of this command was dismounted, as it has been for several years past. The company could hardly do itself justice, as most of its drills have been mounted ones. The stable accommodations at the armory are inadequate. The harness has been recently repaired and was found in good order. The membership of the company covers a large territory; the First Lieutenant living ten miles from the armory, and several men as far. All day drills are held twice each month except in winter. This means the loss of a day to every man who attends, yet the percentage of attendance approaches that of the Infantry companies. The company deserves much credit for preserving so high a standard under such circumstances.

Due credit should be given to Companies A, B, C,

and H, of the First Infantry, and C, G, and H, of the Second, for a full percentage of attendance. This can only be accomplished by a good deal of labor and care, as every one knows who has had company experience. Some evidently deem it almost impossible, while others accomplish it year after year.

Special commendation is due the following officers for drilling without error: First Infantry, Capt. D. F. Shea, and First Lieut. William Sullivan, Company B; First Lieut. Frank W. Tibbets, Company E; First Lieut. Treffe Raiche, Company H. Second Infantry, Capt. E. M. Shaw, Second Lieut. A. W. Buckminster, Company H; Capt. E. O. Upham, First Lieut. John J. Colony, Second Lieut. E. M. Keyes, Company G.

The following officers made only slight errors: First Infantry, Jeremié Soly, Company H; First Lieut. J. Fitzmaurice, Company K; Second Lieut. F. E. Rollins, Company A.

Second Infantry, Capt. C. H. Pitman, First Lieut. H. L. Bickford, Second Lieut. G. F. Davis, Company F; Capt. H. S. Stevens, Company C; First Lieut. Fred E. Barrett, Company H.

Third Infantry, Capt. E. S. Downs, Company G.

Each one of the bands paraded with every man present. The men appeared soldierly, and instruments were in excellent condition, with one or two exceptions in the band of the Second Infantry.

Uniforms, arms, and equipments were generally found to be well cared for. Uniforms fit fairly well except in some of the new companies, having a large number of men. I found two pieces with broken stocks, two broken hammers, one broken sight, two broken ejector springs, one piece badly scratched with emery, and sev-

eral broken firing pins. Criticisms on the condition of arms were generally for dirt and superfluous oil.

It was noticed that some faults were common to a large proportion of the companies, viz., the omission of the side step at the preparatory command for kneeling; a tendency of men to look towards the guide when guide was announced; the neglect of file closers to assist in correcting mistakes; and a too violent "Order Arms." The distance of the leading guide was usually too great. The distance of the leading guide can be constant, if the file in his rear preserves the distance; he is responsible for the distance, and not the guide, who has enough to do to attend to the direction. The positions of the cartridge box should be uniform. I would express my knowledge of the fact that our boxes are so constructed, and in such condition, that a constant readjustment is necessary to keep them in place. It is hoped that before long we can afford something less primitive.

On several occasions it was shown that there was a misunderstanding in regard to the manner of opening boxes. The directions on page 12 of the "Memoranda of Decisions," applies to the McKeever box, and with the box we now use, cannot be properly executed according to those directions. The right hand holds the flap against the body, until the box is inspected.

A few instances were found where men had been enlisted from towns not adjacent. Chapter II, sect. 1, of the Militia Law has not been revoked, and it is advisable to conform to its requirements, even at the expense of one or two good men.

Several of the companies have evidently devoted a good deal of time to guard duty, some have slighted it, and a few have done almost nothing in this direction.

Attention is invited to the note on page 43 of the "Manual of Guard Duty," in regard to memorizing the orders printed in italics. No one should know any less than this, and as it can all be committed in a few minutes, no one should be excused. G. O. No. 7, 1890, from Brigade Headquarters, will be found helpful. I think they can still be obtained at Brigade Headquarters. There were few instances of unfamiliarity with movements in the school of the company. There was one company which had never executed certain movements on the card, and they were omitted at the drill.

It can safely be said that most of the criticisms made, were upon errors of confusion or carelessness, rather than errors of ignorance; but it should be remembered that in actual service, an error of carelessness or confusion may be as disastrous as one of ignorance; so that carefulness and confidence should be cultivated as well as a knowledge of tactics.

Most of the criticisms were directed to officers rather than men, because in most cases they are directly responsible.

I believe the standing of the officers is slowly growing higher; there are still found, however, a few instances of inability to properly realize the "obligations of a commission."

Better armory accommodations are needed in several places; the most urgent needs are at Manchester and Rochester.

Not one of the five Infantry companies in Manchester has suitable quarters. It is surprising that the Manchester companies have reached so high a state of efficiency, handicapped as they are in this direction. If such work can be done under such circumstances, with

quarters suited to their needs, it does not yet appear what they might be. There is no question, that accommodations such as are possessed at Nashua, or at Keene, bring new life.

The luxuries are not needed, or wanted, but the plain necessities of military life should be supplied, and these in the shape of armories are lacking in Manchester.

It is proposed next year to make a slight change in the manner of marking, and it may be well to here announce it.

Under the head of "Knowledge of Duties" in the tabulated report, officers will be allowed four credits each, for excellence, instead of making an average for the officers, as is now done. After consulting with the Inspector of Rifle Practice, it has been decided to increase the number of possible credits in rifle practice to ten, and the same number will be allowed for knowledge of guard duty.

The manner of scaling the credits in rifle practice, will be announced later.

The rating this year will be made according to the usual methods. For the benefit of those who have forgotten that the system of marking has already been explained (I found it was not generally understood), I would refer to the report of the Inspector-General for 1888.

Hereafter the per cent of attendance at drills, and the per cent of those having regular and systematic practice on the range, will not be approximated, but made up from the First Sergeant's roll book and the score book, as ordered in G. O. No. 7, par. III, General Headquarters, 1887. I believe the inspections this year have shown that the Brigade is more than holding its own.

There is a prospect of speedy recovery in all the companies where degeneration was found ; a number of companies have made material progress, and some show very gratifying gains.

You will find a more minute report in the inspection books, which I herewith forward.

I have the honor to be, very respectfully,

Your obedient servant,

ALBERT N. DOW,

Inspector-General.

TABULATED REPORT OF INSPECTIONS AND

		Present and Absent.		Present at Inspect'n		Absent from Inspect'n		Percentage of Attendance.			Records.
		Officers.	Men.	Officers.	Men.	Officers.	Men.	Inspect'n	Encampment.	Drill.	
BRIGADE.											
Field and staff	Concord.....	10	4	10	4	.....	.....	100	97	.....	ex....
FIRST REGIMENT.											
Field, staff, and } non-com. staff..... }	Manchester.....	8	4	8	4	.....	.....	100	100	.....	ex....
Band.....	Manchester.....	.....	22	.....	22	.....	.....	100	100	.....	.....
Company A.....	Dover.....	3	36	3	36	.....	.....	100	86	90	ex....
" B.....	Manchester.....	3	38	3	38	.....	.....	100	71	50	ex....
" C.....	Manchester.....	1	54	1	54	.....	.....	100	.....	.....	.....
" D.....	Dover.....	2	39	2	36	.....	3	92	91	65	ex....
" E.....	Manchester.....	3	35	3	33	.....	2	92	96	75	ex....
" F.....	Derry.....	3	42	3	30	.....	9	78	77	50	good..
" H.....	Manchester.....	2	37	2	37	.....	.....	100	85	80	ex....
" K.....	Manchester.....	2	36	2	34	.....	2	94	85	60	fair..
SECOND REGIMENT.											
Field, staff, and } non-com. staff..... }	Nashua.....	9	5	8	5	1	.....	92	100	.....	ex....
Band.....	Nashua.....	.....	21	.....	21	.....	.....	100	100	.....	.....
Company C.....	Nashua.....	3	39	3	39	.....	.....	100	57	66	ex....
" D.....	Milford.....	3	45	3	41	.....	4	91	.....	.....	ex....
" E.....	Rochester.....	2	47	2	34	.....	13	73	61	60	poor..
" F.....	Farmington.....	3	35	3	33	.....	2	94	67	60	good..
" G.....	Keene.....	3	35	3	35	.....	.....	100	63	74	ex....
" H.....	Keene.....	3	37	3	37	.....	.....	100	71	90	ex....
" I.....	Nashua.....	3	39	3	38	.....	1	97	69	50	ex....
" K.....	Nashua.....	3	48	3	47	.....	1	98	.....	.....	.....
THIRD REGIMENT.											
Field, staff, and } non-com. staff..... }	Concord.....	9	5	7	4	2	1	78	97	.....	ex....
Band.....	Concord.....	.....	24	.....	24	.....	.....	100	100	.....	.....
Company A.....	New London.....	3	39	3	32	.....	7	83	63	40	ex....
" C.....	Concord.....	3	43	3	39	.....	4	91	80	58	good..
" D.....	Pittsfield.....	3	38	3	30	.....	8	80	84	65	good..
" E.....	Concord.....	3	40	3	35	.....	5	88	.....	.....	.....
" F.....	Bristol.....	3	40	3	22	.....	18	58	76	20	good..
" G.....	Lebanon.....	3	36	3	34	.....	2	94	77	50	good..
" H.....	Franklin Falls....	3	38	3	36	.....	2	97	67	50	ex....
FIRST BATTERY.....	Manchester.....	4	69	4	62	.....	7	90	96	55	ex....
CAVALRY, Co. A....	Peterborough.....	3	56	3	50	.....	6	89	100	50	ex....

COMPARATIVE STANDING OF ORGANIZATIONS.

Target prac- tice.	Uniforms.	Arms.	Equipments.	Military Bear- ing.	Guard Duty.	KNOWLEDGE OF DUTIES.										Credits, 1890.		
						INSPECTION.		DRILL.										
						Officers.	Men.	Card.	Captain.	Card.	First Lieut.	Card.	Second Lieut.	Men.				
.....	ex	ex	ex	ex												39	39	
good..	ex	ex	ex	ex		ex	ex										51	46
.....	ex	ex	ex	ex													36	33
poor..	ex	ex	ex	ex	good..	ex	ex	5 ex	2 ex	6 ex	ex	ex	ex				67	62
poor..	ex	good..	ex	ex	ex	ex	ex	6 ex	4 ex	3 fair	ex	ex	ex				61	60
.....	ex	ex	ex	ex		good..	ex											
fair ...	ex	ex	ex	ex	fair ..	ex	ex	6 ex	3 good..	va'cy.	good..	good..	good..				62	57
poor..	ex	ex	ex	ex	ex	ex	ex	1 good..	4 ex	7 good..	ex	ex	ex				65	62
poor..	ex	good..	ex	good..	fair ..	ex	good..	3 ex	5 good..	4 good..	good..	good..	good..				52	46
poor..	ex	ex	ex	ex	ex	ex	ex	3 ex	4 ex	va'cy.	ex	ex	ex				67	61
good..	ex	good..	ex	ex	good..	ex	good..	3 ex	5 ex	va'cy.	good..	good..	good..				60	63
ex	ex	ex	ex	ex		ex	ex										51	50
.....	ex	good..	ex	ex													35	36
.....	ex	ex	ex	ex	good..	ex	ex	5 ex	3 ex	2 ex	ex	ex	ex				60	63
.....	ex	ex	ex	good..	poor..	good..	good..	3 good..	2 fair	6 fair	fair	fair	fair				39	
poor..	ex	ex	ex	good..	fair ..	ex	ex	3 good..	va'cy.	2 fair	good..	good..	good..				51	54
good..	ex	ex	ex	ex	fair ..	ex	ex	5 ex	4 ex	1 ex	ex	ex	ex				61	64
ex	ex	ex	ex	ex	ex	ex	ex	4 ex	3 ex	2 ex	ex	ex	ex				67	67
ex	ex	ex	ex	ex	ex	ex	ex	5 ex	1 ex	4 ex	ex	ex	ex				70	67
good..	ex	ex	ex	ex	good..	ex	ex	8 ex	5 good..	3 ex	ex	ex	ex				62	63
.....	ex	good..	ex	good..		good..	good..											
good..	ex	ex	ex	ex		ex	ex										47	48
.....	ex	ex	ex	ex													36	36
fair ...	ex	ex	ex	good..	fair ..	ex	good..	3 good..	2 fair	4 fair	good..	good..	good..				53	52
good..	ex	ex	ex	ex	good..	good..	good..	5 good..	4 ex	2 fair	good..	good..	good..				59	58
poor..	ex	ex	ex	ex	good..	good..	good..	3 fair	4 good..	5 fair	good..	good..	good..				56	48
.....	ex	ex	ex	ex														
good..	ex	good..	good..	poor..	fair ..	ex	poor..	5 fair	3 fair	2 ex	poor..	poor..	poor..				42	49
poor..	ex	ex	ex	ex	fair ..	ex	ex	4 ex	5 good..	3 good..	good..	good..	good..				57	52
poor..	ex	ex	ex	ex	good..	ex	ex	3 good..	4 ex	6 good..	ex	ex	ex				59	60
good..	ex	ex	ex	ex	ex	ex	ex	ex	ex	ex	ex	ex	ex				67	61
.....	ex	ex	good..	good..	poor..	ex	ex	7 good..	8 good..	5 good..	good..	good..	good..				57	61

STATE OF NEW HAMPSHIRE.

INSPECTOR-GENERAL'S OFFICE,

EXETER, July 31, 1891.

GEN. A. D. AYLING,

Adjutant-General, Concord, N. H.:

SIR, — In accordance with the provisions of par. iv, G. O. No. 6, c. s., I have the honor to report upon the encampment of the New Hampshire National Guard, at the State camp-ground, Concord, June 23 to 27, inclusive:

We again had the good fortune to have with us Col. Loomis L. Langdon, of the First Artillery, U. S. A., whose interest in the N. H. N. G. is more than an official one, and whose valuable suggestions were of great benefit to the troops.

A squad of citizens was employed to pitch the tents; some few were readjusted to suit individual tastes, but the work was done as well as it was in the old way, and was done quicker and cheaper. If a material saving in the expense can be made, this way would seem preferable to the old method of detailing men from the companies. The camp was laid out according to the usual custom. This year the First Infantry occupied the right of the line, the Third was in the center, and the Second on the left. The Artillery and Cavalry were, as usual, on the extreme left.

Tuesday morning dawned cloudy, but by noon the sun came out and the day was bright and warm. The First Infantry (excepting Companies A, D, and F, which came by a later train) arrived at 10.35 A. M., the Third an hour later, the Second at 11.48. They reported to Gen. Patterson in the field, and were ordered to take immediate possession of their quarters.

The Battery started from Manchester at an early

hour in the morning, and arrived at the grounds at 12.50 P. M. The Cavalry assembled at Bennington at 2 o'clock, June 22, and halted for the night at Henniker. Start was made at 5 A. M., June 23, and camp was reached at 11.30 A. M. The men were somewhat wet by the rain Monday night, but not much discomfort was experienced.

Guard-mounting was ordered for 2 P. M.; the first call was sounded at that hour, and adjutant's call at 2.15. The detail from the Second Infantry was late. Only a few men were noticeably unsteady, and the ceremony was unusually good for a first day.

Drill call was sounded at 2.30. It was not promptly obeyed, the men being still busy arranging quarters. The Third Infantry appeared at 2.50, and soon after the First. The Second did not come out as a regiment, but several companies came out for company drills. The Battery and Cavalry were excused until dress parade, to give the men and horses a needed rest. The dress parade of the first day was good for a first day, but distances were too great between the Second Infantry and the Battery, and between the Second and Third Infantry. No policing was done to my knowledge. Calls were not promptly repeated on the first day, and at night no drummers responded to drummers' call in the First and Third Regiments. No marches were played in the company streets, consequently roll-calls were not promptly had, and then, not in all cases, in presence of a commissioned officer. On Wednesday morning roll-calls were prompt in all the commands, followed by the setting-up drill in company streets, or on the parade ground. Some of the new companies in their ardor had company drills before breakfast.

The guard-mount of the second day was not so good as that of the first. The staff officer was late, consequently the details were not prompt in coming on the line. Part of the details came on in single rank and so formed. This has frequently occurred, and the fault belongs to the Adjutant, who should see that the detail is correctly formed when verified on the regimental parade.

In obedience to G. O. No. 2, par. VII, c. s., referring to G. O. No. 4, par. v, series 1890, tents were generally looped in the First and Third Infantry; looped tents in the Second Infantry, Battery, and Cavalry were the exception, not the rule. After the first morning the order was universally obeyed. All the commands appeared promptly for drill; the cool weather was favorable to hard work, and hard work was done, with little rest until recall at 11.30. His Excellency, the Commander-in-Chief, arrived in camp with his staff at 11.45 A. M., escorted by Troop A. He was received with the proper salute, and was welcomed at Headquarters by Gen. Patterson and staff. He honored the camp by his presence until Friday night. The two hours for drill, called for on the routine, was fully occupied by all the commanders, the infantry confining itself to battalion movements. After brigade dress parade, regimental dress parades were had in the Second and Third Infantry, and the First was inspected.

Thursday was the best working day of the week; all the organizations having become accustomed to the routine. The Third Infantry was inspected at 1.45 P. M., and the inspection of the Second took the place of the regular regimental dress parade at 5.45.

The Cavalry and Battery were inspected on the morning of the 26th, by Col. Langdon. A short drill

followed the inspection in each organization. The inspections and drill were very creditable to both commands, and they received the commendations of Col. Langdon.

The inspections were all hurriedly made, as the armory inspections had just been completed. The companies were practically as I found them at their armories. The only criticisms I would offer are concerning a few unblacked boots, quite a number of tarnished belt plates, and at least two cases of general untidiness. It is expected that men will prepare for these camp inspections with as much care as for those at the armories.

We had the honor to entertain as a guest, the Secretary of War, Redfield Proctor, who arrived with Gov. Page of Vermont, and other guests, at 11 o'clock, escorted by Troop A. They remained through the afternoon.

The usual amount of work was done in the forenoon, and the time was improved previous to review. Rain cut short the work, but the weather was again fair at 4, the hour appointed for review. This ceremony was very smoothly executed; formation was quickly made, and the men with hardly an exception steady. The distances between companies should have been better in several cases, in the march past the reviewing officer. Salutes were generally well rendered. A few officers did not turn the head in saluting, and there was a tendency to salute too soon. One officer (not from one of the new companies) saluted at fully four times the prescribed distance. The alignments were generally excellent, as were also the carriage and general appearance of the men; but the good appearance was affected in several companies by men turning their heads.

Guide right does not mean look to the right. Perfect alignment cannot be maintained if the shoulders are not square, or at right angles with the direction of the march, and the shoulders cannot be maintained in that position if the eyes are not kept to the front.

The review was one of the best I have seen here, as was the dress parade following. The smoothness was somewhat ruffled by the tardiness of the Third in responding to Adjutant's call; all were a little slow, owing to a misunderstanding in regard to the time set for Adjutant's call.

The guard-mount on the last day was not what it should have been on a fifth day; some of the details again came on in single rank, and were sent back to the regimental parade. The junior officer inspected the rear rank instead of the second platoon.

The new guard was marched to the guard-house, but only a part of one relief was posted, on account of the short time before breaking camp.

In view of some of the errors made at guard-mount, I would bring to the notice of officers a few suggestions, nearly all of which I believe have been mentioned in former reports: The staff officer can complete the left four at the same time that he verifies, and before counting fours, knowing the number of men detailed. In assigning the officers and non-commissioned officers to their posts, the officer passes along the front of each rank, from right to left, and from left to right in its rear, passing around the rear and right of the rear rank to his post. The guard is halted and dressed by the staff officer, not by the senior officer of the guard.

The Cavalry left camp at 5.50 A. M., June 27; the Battery left at 1.30 P. M., both expecting to reach home by night. All the regiments came out for drill in the

forenoon, the First and Third took up battalion movements, and the Second had company drills. Tents were struck at 1 o'clock, and carried to the arsenal by companies in succession, as fast as the property could be received and cared for. Line was formed at 2.15, and the three regiments, preceded by the Brigade Commander and staff, marched to Railroad Square, where Colonels took command of regiments, and the companies soon took trains for home. The following table will show at a glance what proportion of credit is due the several organizations for percentage of attendance.

ORGANIZATION.	PRESENT.						ABSENT.			Aggregate.	Percentage of attendance.	Percentage in 1890.	Percentage in 1889.
	Officers.			Enlisted Men.			Officers.	Enlisted men.	Total.				
	Field and staff.	Line.	Total.	Non-com'd of- ficers, musi- cians, and pri- vates.	Band.	Total.							
Brigade Staff.....	10	....	10	5	....	5	1	....	1	15	97	97	95
First Infantry....	8	22	30	321	24	345	2	35	37	406	92	86	77
Second Infantry.	9	23	32	285	24	309	2	81	83	401	82	68	66
Third Infantry...	9	21	30	206	24	230	..	112	112	356	71	78	60
First Battery.....	....	4	4	61	....	61	..	8	8	72	90	96	99
Co. A, Cavalry....	....	3	3	55	....	55	..	....	....	58	100	100	100
	36	73	109	933	72	1,005	5	236	241	1,308	84	80	72

That a good deal of credit is due, no one will deny who knows what it means to secure the percentage credited to the Cavalry, or the First Infantry. These results do not come by chance.

In recent years I have never known property to be willfully injured, but more care should be exercised in

certain directions. Many tents are torn every year by shrinking guy ropes, in wet weather. No less than sixty-five were found on the last day, with tears at the end of the ridge pole. Guys should be looked after in wet weather, and never strained too tightly. Two tents were considerably injured by fire during the week, I understood no one was to blame. Small holes were found in several tents which might have been made by bayonets. I would recommend that arms be not stacked inside of tents; a stack is unstable on a tent floor where men are passing, and if broken, bayonets are likely to pierce the canvas. Most companies are now provided with gun racks; all should be, for convenience, as well as for security of property.

Policing was well attended to after the first day. Regimental commanders were made responsible for the policing of their own grounds, and the general parade was policed by a detail in charge of a staff officer.

The refuse at the cook-houses could not be conveniently disposed of on the first day, owing to the non-arrival of the tubs. Several tours of inspection of the sanitary arrangements, disclosed nothing worthy of criticism.

A few men were reported sick on the morning reports of the last three days, but the Medical Director reports no sickness worth mentioning during the week.

Sacred services were held in each of the Infantry organizations every morning, at which all of the men not on duty were present.

Discipline was commendable. The nights were comparatively quiet, so far as I learned, and were so reported by the officers of the day.

A slight disturbance Wednesday evening, was occasioned by seven of Concord's gilded youth, who

promised to behave after being confined for a short time at the guard-house.

Salutes and courtesies were well rendered in some companies, and neglected in quite a number. It was noticed in passing successively through company streets, that all the men of some companies always saluted, and in others this was generally neglected. This would seem to indicate that company commanders are responsible, rather than individuals. Calls as a rule were promptly and accurately repeated after the first day.

The failure of the drummer of the First Infantry to respond on Thursday, was due to the strong wind, which made it impossible to hear calls from Headquarters.

The drummers of the guard were well instructed. All the drummers were drilled each day by the Senior Drum Major, or the Senior Drummer, and they showed the good results of the practice.

The Signal Detachment under the supervision of Capt. Charles Francis Sawyer, Brigade Commissary, did its share of work. Besides the regular flag and torch, they use at night red and white flash lights, with which they do faster work than with the swinging torch. The detachment was quartered this year at Brigade Headquarters.

Guard duty was not so well performed as it would have been, had there not been an unusual number of men on guard, who had not previously performed guard duty. The performance this year is no criterion of what the brigade is doing in this branch of the work; for there is no doubt that more and better instruction is now given at the armories than ever before. I endeavored to obtain a correct proportion of the new men on guard each day, but a list was not sent me on

the third day, so that an accurate statement cannot be made, but the number each day approximated two thirds of the guard.

The uninstructed men were eager to learn, and evidently did their best, but they should have learned the first principles at the armory.

It is evident that company commanders are not obeying the spirit of par. v, G. O. No. 6, c. s. (respecting the enlisting of uninstructed men after May 1), if they conform to the letter.

The white helmets lately issued are evidently appreciated; they add much to the appearance of the men, as well as to their comfort.

The marker's flags are rather dilapidated, but now they have been discarded in the regular service, new ones will probably not be secured, or need not be. It was my intention to have each field officer drill his regiment by card; one of the three cards in each regiment to call for skirmish movements. Owing to the very limited time, this plan could be only partially carried out.

The field officers appeared familiar with the movements in the school of the battalion, as also were most company commanders. The result of the drills was gratifying, considering the fact that almost nothing is done in such work, except at these encampments.

Not so much time as usual was devoted to skirmish drill; partly for the reason that the new companies had never taken it up, and because the space was rather limited when all the organizations were on the field together.

The excellent music furnished by the bands contributed in no small degree to the enjoyment of officers and men.

The administration at Headquarters was as smooth as if the newly appointed staff officers had been veterans in their positions.

All things considered the encampment must be regarded as one of the most successful we have ever had; the weather was never more propitious; never before have we had so large a percentage of attendance; in spite of the shortness of the time, more was accomplished than in some years when we have had more days, for no time was lost. The gains made in the appearance of the men, and in the promptness, accuracy, and smoothness with which movements were executed, were almost noticeable from day to day. The difference between the appearance on the first day, and that on the last, was very marked, and indicates something of what might be expected, if more time could be had. It is to be hoped that we may be able to afford longer encampments in the future, as doubtless the results accomplished are greater in proportion to the money expended when we camp for longer periods.

I have the honor to be,

Your obedient servant,

ALBERT N. DOW,

Inspector-General.

REPORT OF COLONEL LOOMIS L. LANGDON,
FIRST ARTILLERY, U. S. A.

CONCORD, N. H., June 27, 1891.

TO the INSPECTOR-GENERAL, U. S. ARMY,
Washington City, D. C.:

GENERAL, — Pursuant to Special Orders, No. 99, dated Headquarters of the Army, Adjutant-General's Office, Washington, May 1, 1891, I have visited the camp of the First Brigade, National Guard of New Hampshire, and now have the honor to make a report of the result of my inspection.

I arrived in Concord on the afternoon of Monday, the 22d of June, and proceeded to the camp next morning, arriving in the camp before the troops, who, however, soon came on the ground. The military exercises began at half past one with a brigade guard-mounting, which was followed by drills, brigade dress parade, and regimental dress parade.

The daily routine was as follows, viz: Drummer's call, 5.30 A. M. Reveille, 5.45 A. M. (This was followed by setting-up drill, superintended in each company by a commissioned officer; this lasted 15 minutes.) Police call, 6.10 A. M. Surgeon's call, 6.30 A. M. Breakfast call, 6.45 A. M. First Sergeant's call, 7.30 A. M. Drummer's call, 8 A. M. Signal for guard-mounting, 8.10 A. M. Assembly of guard details, 8.15 A. M. Adjutant's call, brigade guard-mounting, 8.30 A. M. Orderly hours, 8.45 A. M. Drill call, 9.30 A. M.

Recall, 11.30 A. M. Orderly hours, 11.45 A. M. Dinner call, 12 M. Drill call, 2 P. M. Recall 4 P. M. Drummer's call, followed immediately by the signal for dress parade, 4.45 P. M. Assembly and roll-call, 5 P. M. Adjutant's call, dress parade, 5.10 P. M. (This was usually followed by a practice review march by the whole command past the reviewing stand, but on one occasion this was dispensed with to enable me to inspect one of the infantry regiments.) Adjutant's call for regimental dress parade, and regimental dress parade immediately following, 5.45 P. M. Supper, 6.30 P. M. Tattoo, assembly, and roll-call, 10 P. M. Taps, 10.30 P. M.

All roll-calls were superintended by a commissioned officer, who reported the result, with any violation of orders or military discipline, to the regimental commander.

In my opinion this encampment has been a decided improvement upon all those that have previously come under my observation. Gentlemen who have seen all the encampments of late years have told me this one has been the best of all. By inspecting the above table it will be seen that, exclusive of parades and ceremonies the men spent 4 hours and 15 minutes each day in actual drilling. That this time is passed in hard, earnest, and zealous work, conducted with New England conscientiousness, I can personally vouch for, because I have daily witnessed it. The two parades in the evening may seem at first sight rather exacting, but the whole time consumed by these is rarely more than an hour. These parades are good for the officers and men; quite as beneficial as a drill, and more interesting than a drill to all concerned.

The camp was pitched with great care and regularity;

the tents in first-class order, and so far as I saw not one was torn or mildewed, showing that great pains are taken to preserve them in good condition while in store and when not in use. The government property in the possession of the State of New Hampshire is well taken care of with the exception of the rifles in care of the companies, and these are serviceable, but not in as good condition as they might be kept with a little more care expended by their individual possessors. Marks of old rust were visible on the barrel and in the chamber of every musket examined by me.

POLICE.

The police of the camp was excellent, and care seemed to be taken by the officers and men to avoid littering the ground with old newspapers, orange and banana peel, etc., the usual *débris* of a camp. It would be difficult to find a neater camp than the camp of the New Hampshire troops. At the first call for morning drill every tent was left clean, and all the bedding neatly folded. This good police was quite noticeable in the vicinity of the kitchens and mess-tents and officer's quarters.

DISCIPLINE.

The discipline of the brigade will compare favorably with that of regular troops. So far as I could see the men were obedient to their officers, and the officers were loyal and courteous to their superiors, nor did I hear a single instance of criticism, discussion, or animadversion of the orders received from higher authority. I saw nothing of the disgraceful "bouncing" and horse-play upon which I was obliged to comment last year. If there was a single instance of drunkenness I did not hear of it, nor did the brigade commander. Each offi-

cer and man seemed to act as if his individual good conduct must give tone and character to his company and regiment, and thus the reputation of the whole body reflects back honor and glory to the individual.

RESULTS.

The annual encampment of the New Hampshire Brigade was designed and is maintained for the purpose of instructing its National Guard in the most effective way and with the least expense to the State. From this view of the matter the annual encampment fulfills its object, and the encampment this year has been fruitful of results. The troops have been better instructed this year than heretofore, and there is noticeable an improvement in discipline and soldierly conduct and appearance. The number of the ceremonies was not excessive and the time could not have been more beneficially employed. It was, however, a subject of general regret that the time given for the encampment was so short; but all was done that could be done in five days. As a class the officers are competent, and both officers and men evince the liveliest interest in learning their duties. I have never seen guard duty so well performed in camp as it was this year, nor have I ever seen men more anxious to learn their duties.

In the order of relative excellence I should place the different organizations as follows, viz: First Regiment Infantry, excellent; Second Regiment Infantry, excellent; Third Regiment Infantry, very good; Light Battery, excellent; Troop of Cavalry, excellent.

In the order of attendance the Cavalry Troop A, ranks first, the Battery next, then the First Regiment of Infantry, then the Second, and, last, the Third Regiment, which had only 258 officers and men present in

the encampment, comparing unfavorably with the First Regiment, which had 399 officers and men present in the encampment.

When it is remembered that each Infantry Company can assemble for instruction once a week throughout the year in its armory for instruction, and that the Light Battery, and Troop A of Cavalry can seldom, if ever, be assembled for mounted instruction except during the few days of encampment, it is all the more creditable to those two organizations that there is no company in the brigade superior to either of them in discipline, military instruction, and soldierly bearing of its men.

RECOMMENDATIONS.

I would respectfully recommend more attention be paid to the following points, viz :

First. "Setting up" of the men.

Second. Simulated guard instruction in the armories.

Third. Skirmish drill.

Fourth. Gallery practice with reduced charges.

Fifth. I renew the recommendation I had the honor to make last year, namely, that in such towns of the State as have Federal buildings and companies of the National Guard without armories, the Federal Government should allow the guard the use of some of the rooms till such time as the State government can build armories. If only one room in each large town could be thus made use of, it would be of great benefit to the National Guard, and might prove, in the event of a riot, of incalculable benefit to the Federal Government by furnishing a center for concentration in the very building which would be the first object of the Government to protect.

Sixth. I further recommend the purchase, by the

State, of more land for the encampment ground. As large as the field is, it should be four times as large as it is now to give the regiments, troop, and battery fair facilities for drill. The field is too small for brigade evolutions, even of the simplest character, if the troop and battery were to be combined with the infantry. The infantry of the brigade can be maneuvered alone, in a few simple movements, in the present field, but problems in minor tactics would be impossible. Besides, with more ground it will be possible to make a range for musketry practice, which is much needed.

Seventh. I would also recommend a division of the staff duty. At present, all the duties pertaining to the ordnance, quartermaster, and adjutant-general's bureaus are thrown on General Ayling. That they are performed in a manner that is faultless, is known to every one; but the work is too much for one man with inadequate pay and insufficient clerical assistance.

In closing I desire to express my appreciation of the courteous kindness with which I have been treated by General Patterson and his entire command. The friendliness and comradery that these brave, good men show to the officers of the regular Army make my inspections of this brigade looked forward to by me with the pleasantest anticipations, and I bid adieu to them with regret, while it gives me the greatest pleasure to note their steady improvement in the knowledge and practice of our exacting profession.

Very respectfully, your obedient servant,

LOOMIS L. LANGDON,
Colonel First Artillery, Inspector.

REPORT OF INSPECTOR OF RIFLE PRACTICE.

OFFICE OF INSPECTOR OF RIFLE PRACTICE,
NEW HAMPSHIRE NATIONAL GUARD,
CONCORD, January 28, 1891.

GEN. J. N. PATTERSON,
Commanding First Brigade, N. H. N. G.,
Concord, N. H.:

SIR,—In conformity with Special Orders, No. 4, Headquarters First Brigade, dated Concord, August 10, 1890, I have the honor to make the following report of the condition of the several companies of the brigade, in rifle practice during the season of 1890.

At the request of the Adjutant-General of the State, I prepared an order (General Orders No. 3) which was issued from General Headquarters March 12, 1890. Several changes were published in this order which were made necessary on account of like changes being made in the Regulations adopted by the regular army of the United States. Other changes were deemed to be necessary for the interest of the National Guard. At the suggestion of the Adjutant-General, a "time limit" was prescribed for making requisition for ammunition. August 1 was named as the expiration of this "time limit." Some captains did not receive their allowance of ammunition, on account of waiting until after that date before forwarding their requisitions.

Score cards have been issued to each company, and these are required to be forwarded to the Inspector of Rifle Practice the first of each month. These cards

have been of great benefit to me in watching what each company was doing. The order has not been generally fully complied with by captains.

The annual reports of rifle practice from each company, according to orders, should be made "on or before the tenth day of December." This order has been entirely ignored by the Third Regiment, no return having been made to this department therefrom. I wrote to the Headquarters of this command in relation thereto, and in reply received word that the reports would be forwarded in a short time. This was a month since, and a reasonable space of time having elapsed I make this report without hearing from this regiment. I also have to report the non-receipt of returns from Company B, First Regiment, and Troop A, Cavalry.

Since my report of a year ago, the State has received from the general government several hundred sets of skirmish targets and frames, a large number of "mid" and "long range" targets, and a quantity of "pasters," for covering shot holes. These pasters are black and buff. The buff ones are not worth the paper of which they are made, and are consequently practically of no use. There is no sticking quality to them that can be discovered. The black ones are satisfactory.

Generally a very creditable amount of interest is displayed by the men in this branch of the service, and they seem to be more than anxious to secure the "buttons" and "badges" offered by the State for proficiency in marksmanship. This year there seems to be a slight falling off in this direction, especially in those companies where last year men made the required per cent for marksmen's and sharpshooters' classes, on account of the non-receipt, till late in the season, of these much

coveted insignia. On account of the severe illness of both the gentlemen having the contract to make these badges, they were delayed a most unreasonable time.

The weather during these inspections was in a great many cases stormy ; in consequence thereof I postponed visiting some companies till a later day. At my request Lieut. A. M. Dodge, Q. M., Third Infantry, visited Company A, Third Infantry, at New London, rain preventing my doing so. He performed the duties assigned him with much credit.

It was noticed that some companies did not comply with instructions given a year ago in relation to having proper "marking discs and danger signals." It is imperative that these should be obtained, not only on account of the safety to the markers and people happening to be in the vicinity of the "butts" while practice is being held, but also that there may be uniformity and compliance with regulations in the matter. A range should be equipped with proper flags, etc., so that no possible chance may occur of persons being injured.

In case some party should be hurt, and it was known to me that the company on whose range the accident took place had not the necessary signals, I should not hesitate to immediately recommend the disbandment of that company. The old maxim, "An ounce of prevention is worth a pound of cure," is most applicable in these cases. I trust that those companies that have not conformed to the requirements in this regard will take this matter to themselves, so that it will be unnecessary to call their attention thereto again.

It is very gratifying to see the marked change and interest that has occurred in the First Regiment. This regiment has for some time been under the disadvantage

of not being able to secure a suitable range for the battalion in Manchester. Several places have been looked over and plans been made to begin practice thereon, when either the city or the owners of the land have sold or changed their minds so that practice could not be obtained. Finally a most satisfactory range was secured in the vicinity of "Rock Rimmon," where 800 yards can be easily obtained. The several companies have each had erected suitable shelters and butts. The target frames are modeled somewhat after the one known as the "Brinton target." Its workings are similar to that of a window frame (sliding up and down).

Several companies in the brigade use the "Wingate," some the "Michaelis," while the majority use the single target, discing after each score of five (5) shots. I would advise pasting after each shot, whenever practicable.

Since my inspection of a year ago, three companies (E and K of the Third, and D of the Second Regiment) have been disbanded. The following is the condition of the remaining organizations of the brigade.

FIRST REGIMENT.

Company A, Captain Demerritt. The rifles of this command are in "fair" condition. They have the appearance of having been left uncleaned since the last encampment. Several firing-pins found to be broken. Company B, Captain Shea. Have had no practice till late this fall. Guns in "fair" condition, clean, but several firing-pins broken. No armory practice. Company C, Captain Pattee. Rifles in "excellent" condition, with exception of several broken firing-pins and hammer-screws. The town authorities have pro-

hibited this company from having armory practice ; the armory is located in town hall. Company D, Captain Scott. Arms in "poor" condition, thirty-three (33) rifles having broken firing-pins, and two (2) gunstocks broken. Armory practice not held. Company E, Captain Wilson. Rifles generally in "excellent" condition. Two (2) gunstocks broken, one (1) front sight broken, and one (1) rear sight broken. Company F, Captain Frye. Fifty (50) per cent of rifles in "excellent" condition. Fifteen (15) rifles in very "bad" condition, some having either sights, firing-pins, hammers, or hammer-screws broken or lost. One (1) rifle completely covered with rust, and worthless. Company H, Captain Soly. Fifty-eight (58) per cent of rifles in "excellent" condition. Fifteen (15) guns with some part broken or gone, such as firing-pins, cam-latch, and springs ; one (1) broken stock. Company K, Captain O'Malley. Rifles generally in "good" condition. Several firing-pins noticed to be broken.

SECOND REGIMENT.

Company C, Captain Stevens. On my arrival the captain informed me that he had forgotten all about my visit, and consequently had not notified the members of his company. In company with the captain I visited the room used by this command as an armory (it is more of a store-house), and inspected the rifles in its custody, with the following result : The arms are kept packed in boxes, no space being available for gun racks. Nineteen (19) broken firing-pins. One (1) broken main-spring. One (1) broken cam-latch. One (1) broken ejector. One (1) broken sear and sear-spring. Two (2) guns with stocks very badly dented, and barrels scratched. The company has no regular

range, and also no armory practice. Company E, Captain Berry. The rifles of this organization do not appear to have been properly cleaned; in some cases not cleaned at all. Several firing-pins broken. One (1) gun with lock broken. Company F, Captain Pitman. The rifles are in "excellent" condition, six (6) firing-pins being the only damaged parts discovered. Some of the locks in this company should be taken out and thoroughly cleaned and oiled. Company G, Captain Upham, and Company H, Captain Shaw. These two companies are known as the Keene Battalion. The rifles are numbered consecutively from one (1) to ninety-six (96). These rifles are kept in the very "best" condition, an armorer being employed who looks to the care of all equipments. Twenty-four (24) rifles with broken firing-pins, and one (1) with no cam-latch were noticed. Company I, Captain Parmenter. I visited this company on the occasion of its annual celebration in honor of the "honorary members." The rifles in this company are in "good" condition. A few firing-pins were noticed broken. Several prizes are offered by the company for proficiency in shooting, and are always shot for on these occasions, the range being 200 yards, and number of shots allowed ten. Company K, Captain White. This company has been placed in a bad condition, owing to the wretched management of the captain. His affairs were in such a condition that he was obliged to move out of town. After his departure it came to the knowledge of Lieutenant Fruean, who is now in charge of the company, that several articles of government property had been left by the captain in the barn on his former premises. This is given as a sample of his carelessness. Lieutenant Fruean did not receive word from White that I was to

be in Hillsborough until two days before my arrival, and another date was given from the one named by me, in letter. The rifles were examined and found to be in "excellent" condition, only one (1) firing-pin and one (1) lock being out of order.

THIRD REGIMENT.

Company A, Captain Reed. At my request this company was visited by Lieut. A. M. Dodge, Q. M., Third Infantry. The following is an extract from his report: "Condition of rifles, good. I should have given them excellent, but one gun had not been cleaned since being used." Company C, Captain Trenoweth. The captain reports that his men have considerable trouble in keeping their rifles in proper condition, for the following reasons: Their armory is located in one of the upper rooms of the city hall building; a leak in roof (directly over the armory), which they have been unable to have repaired, has caused the room to be in a continual state of dampness, as the water after a rain comes down the wall directly in rear of the gun-racks. The day I visited this company I found the rifles to a great extent rusty, notwithstanding the oiling and cleaning they had been subjected to, only a few days before. Several firing-pins were found to be broken. Company D, Captain Hill. Improvement is noticed in this company since last report. With the exception of two (2) useless guns, and three (3) guns with no hammer-screws the rifles are in "excellent" condition. The range of this company is located three (3) miles from the town. A weekly shoot is held during the season. Company F, Captain Coolidge. The members of this company shot at 200, 300, and 500 yards, in my presence, and all appear to have a sound understanding of

what is required in this practice. Condition of rifles "excellent." Two (2) firing-pins broken, two (2) guns somewhat scratched, as if sand-paper had been used thereon. Range is located about three (3) miles from the armory. Captain absent on account of business. Company G, Captain Downs. Rifles in "excellent" condition. Rain caused a stop in the range practice, just as the company had commenced. There are one or two small parts of the rifles broken. Company H, Captain Cheever. No inspection was held on the range with this company, on account of the recent heavy rains having washed out and otherwise damaged the land on which the "pits" are located. The range extends along the bank of a river. Condition of rifles "excellent." No broken parts discovered.

CAVALRY.

This company is scattered over a large extent of territory, and to get them together would take one full day, and for this reason I did not urge Captain Davis to have them on the range. The rifles, two (2) in number, are in "excellent" condition. Armory practice is not held.

BATTERY.

Captain Piper was given the option of either an armory or range inspection. That in the armory was selected. On my arrival the battery was manned, and a very handsome "present" tendered. This is the only command in the Brigade that received the representative of this department properly, either in the armory or on the range. This is as much of a ceremony as the inspection by the Inspector-General. A part of the ceremony was performed by Company F, Second,

and by Company C, Third Regiment. Whenever the members of the Battery desire to practice, they are obliged to borrow a sufficient number of rifles from Captain O'Malley's company which is a much regretted circumstance. Considerable discussion has been held by members of the Guard, as to "why the Battery boys should be inspected in rifle practice?" In the regular army of the United States battery men are drilled as infantry, with the rifle, and when on post doing guard duty, are armed with rifles loaded with ball cartridges.

Every regiment of artillery in the regular service is armed and equipped as above. One (1) rifle is issued by the State to the Battery. This is not enough, and I trust that an arrangement with the Adjutant-General will be made, so that perhaps at least five or six may be carried on the "returns of property." A glance at the tabulated statement of "Qualified Marksmen" will show what this organization has been doing this year.

RECOMMENDATIONS.

I would suggest that an order be issued, to the effect that men who have not made in armory practice 65 per cent of each possible score in regular practice at 200, 300, 500, and 800 yards elevations during the winter season, be not allowed to shoot on the range until the required per cent has been attained. These different ranges should be taught in the armory. Chapter III. of Part I. Blunt's Manual, will give all the needed information, and if a regular course of instruction was started in each company with this object in view, the men would make better and steadier marksmen on the range than at present. I do not believe in taking a man on the range to shoot until he has had some preliminary instruction, which can only be obtained in the

armory. Minute instructions are to be found in the above-named chapter, giving the proper elevation from the floor where the "secondary bull's eye" should be placed, the aiming and sighting drills, etc. These drills should be made as much a part of the winter work as the manual of arms and the several movements of the company. If these regulations were to be carried out, I am convinced it would be a saving, not only of ammunition, but the benefits which would accrue to the men would more than repay them for the time they had expended in this manner.

Requisitions for anything that pertains to a rifle should be forwarded through this office. A record is kept here of all requisitions received and what is called for by captains thereon, if the same has anything to do with rifles or rifle practice. During the season just closed, requisitions for 43,500 rounds of "service cartridges" were approved and forwarded to the Adjutant-General. This is an increase of 13,500 over the amount issued in 1889, and was caused by the increased allowance, as published in G. O. No. 3, A. G. O.

In my last report I called attention to the act of Legislature creating the department of Rifle Practice, and I feel it due to the officers and men in the Brigade to again speak of the matter. Some provision should be made whereby the men can receive some compensation for these inspections. This can only be done by an increased appropriation, and having at the same time a clause inserted to that effect. Why should the men be paid for the inspection by the Inspector-General and not for those of this department? The Inspector-General (with few exceptions) inspects the companies in the evening at their armories. The inspections by the Inspector of Rifle Practice are supposed to be on

the range, in the daytime. It is an easy matter for the men to be present at night, but in the daytime they must in a great majority of cases leave their work so as to be present on the range, thereby causing a loss to themselves of at least half a day's pay. If they could be paid something, I am of the opinion that more would turn out and better results be accomplished than under the existing laws.

I also beg leave to suggest that, as the department of rifle practice is every year growing, and very rapidly, that provision may be made for a Regimental Inspector of Rifle Practice, with rank of First Lieutenant. This can be done without any material increase in the expense of maintaining this branch of the service. Under existing laws the Inspector of Rifle Practice is allowed pay and expenses, not to exceed three hundred dollars (\$300), while making his inspections. This amount can be divided proportionately among the brigade and regimental inspectors, and still be within the sum appropriated. The duties of the Inspector, under the present system, are getting to be more than one man can personally supervise. I trust that the Legislature will do something to remedy this question at its present session.

In closing this report I wish to say a word or two in regard to competitive shooting. It would be a great pleasure to me to see some inter-regiment or company matches arranged, during the proper season, for a suitable trophy. Colonel G. M. L. Lane, of the First Regiment, has offered a very handsome medal, to be awarded to that man in his command making the highest record this season. In order to have this medal become his personal property the man must win it two years consecutively. A local printing establishment in

Manchester offered a very valuable medal to that man in the Brigade making the highest score with twenty-five (25) shots, off-hand, in a match held in Manchester during the latter part of last October. This medal was won by Corporal M. H. Degnan, Company I, Second Regiment, of Nashua, with a total score of 100 points; his nearest competitors having 99 and 98 respectively.

I am indebted to all officers and men in the N. H. N. G. for attentions shown while on this tour of inspections, and especially to Gen. A. D. Ayling, Adjutant-General, and Lieut. A. M. Dodge, Quartermaster Third Regiment.

I am, sir, very respectfully,

Your obedient servant,

HARRY B. CILLEY,

Major and Inspector of Rifle Practice.

SHARPSHOOTERS.

Highest possible score, 300. Requirements for qualification, 60 at 200 yards, 60 at 300 yards, 60 at 500 yards, 60 at 800 yards.

Insignia of this class, badge of gold, with bar inscribed "Sharpshooter." Officers and men qualifying for two years allowed an additional bar for each year, with date thereon.

FIRST BRIGADE.

	SCORES.		
	1888.	1889.	1890.
Maj. H. B. Cilley, I. R. P.....	227	257	....
FIRST REGIMENT.			
<i>Co. A.</i>			
Captain George H. Demeritt.....	243
Sergeant W. H. Foss.....	252
<i>Co. E.</i>			
Lieutenant Frank W. Tibbetts.....	262
Private C. E. Jeffrey.....	257
SECOND REGIMENT.			
Colonel A. W. Metcalf.....	242	231	242
Major F. O. Nims.....	232	251
Surgeon Geo. W. Flagg.....	246
Adjutant Sumner Nims.....	226	241
Hospital Steward J. M. Hovey.....	220	249
<i>Co. F.</i>			
Captain C. H. Pitman.....	224	244
Lieutenant A. Garland.....	234	....
Lieutenant H. L. Bickford.....	233	245
Sergeant G. F. Davis.....	223	242
Sergeant C. E. Peabody.....	240
Private T. E. Butler.....	223	....
Private J. H. Hersey.....	240
Private H. C. Wentworth.....	240
Private W. T. Wentworth.....	250
<i>Co. G.</i>			
Lieutenant F. C. Foster.....	228	258
Lieutenant J. J. Colony.....	220	241
Sergeant E. M. Keyes.....	236	237	252
Sergeant J. C. Reed.....	227	243
Corporal C. T. Colony.....	219	241	246
Corporal O. H. Holbrook.....	222	245
Private C. H. Clark.....	245	267	....
Private G. A. Quilty.....	230	240	....
Private H. R. Beals.....	227	....
Private F. P. Gaynor.....	222	242
Private W. B. Hills.....	230	269
Private H. W. Keyes.....	237	248
Private B. S. Osgood.....	224	....
Private E. W. Gustine.....	221	....
Private F. W. Walker.....	251
Private L. A. Piper.....	251
<i>Co. H.</i>			
Captain J. P. Wellman.....	233	247
Captain E. A. Shaw.....	227	238	256

SHARPSHOOTERS.—*Continued.*

FIRST BRIGADE.

	SCORES.		
	1888.	1889.	1890.
<i>Co. II.—Continued.</i>			
Lieutenant F. E. Barrett.....	.....	223	247
Sergeant J. C. Faulkner.....	.....	230	248
Sergeant T. A. Smith.....	.....	219	243
Sergeant P. F. Babbidge.....	.....	223	249
Corporal A. O. Dexter.....	.....	224	243
Corporal W. C. Howes.....	.....	231	.....
Corporal W. E. Wright.....	.....	235	250
Private F. N. Barker.....	.....	225	242
Private H. S. Foster.....	.....	222	.....
Private A. W. Green.....	.....	233	243
Private J. F. Moore.....	.....	224	251
Private J. H. Plum.....	.....	236	252
Private C. H. Tenney.....	.....	223	248
Private Giles Taintor.....	.....	243	.....
Private A. E. Bissell.....	.....	.....	242
<i>Co. I.</i>			
Lieutenant W. H. Goodspeed.....	.....	223	245
Sergeant F. H. Thompson.....	.....	237	245
Sergeant F. M. Kelley.....	.....	.....	245
Lieutenant W. R. Seaman.....	.....	.....	243
Corporal M. H. Degnan.....	.....	236	252
Private H. P. Valcour.....	.....	230	252
THIRD REGIMENT.			
Lieutenant A. M. Dodge, Quartermaster.....	227	225	.....
<i>Co. F.</i>			
Captain C. W. Coolidge.....	.....	223	.....
Sergeant E. M. Drake.....	.....	223	.....
Corporal L. S. Gray.....	.....	222	.....
Corporal F. T. Davis.....	.....	220	.....
Private W. E. Crawford.....	.....	219	.....
Private J. T. Ballou.....	.....	228	.....
<i>Co. G.</i>			
Captain E. S. Downs.....	236	224	.....
Lieutenant G. A. Freeto.....	235	230	.....
Lieutenant B. M. Reynolds.....	224	.....	.....
Sergeant E. H. Plummer.....	232	224	.....
Corporal A. W. Buckwell.....	227	.....	.....
Corporal G. Poland.....	.....	225	.....
<i>Co. H.</i>			
Sergeant A. W. Rollins.....	235	.....	.....
Corporal F. Gomo.....	.....	228	.....
Musician F. W. Clough.....	227	227	.....

MARKSMEN.

Highest possible score, 225. Requirements for qualification, 60 at 200 yards, 60 at 300 yards, 60 at 500 yards. Insignia of this class, badge of silver, with bar inscribed "Marksman." Officers and men requalifying for two years allowed an additional bar for each year, with date thereon.

FIRST BRIGADE.

	SCORES.		
	1888.	1889.	1890.
Major H. B. Cilley, I. R. P.	177	194	195
FIRST REGIMENT.			
Co. A.			
Captain Geo. H. Demeritt.	182
Sergeant W. H. Foss.	188
Corporal F. H. Keenan.	184
Co. C.			
Sergeant N. H. Roberts.	181
Corporal G. W. Kimball.	180
Co. E.			
Lieutenant F. W. Tibbetts.	201
Private Harry Rogers.	189
Private C. E. Jeffrey.	192
SECOND REGIMENT.			
Colonel A. W. Metcalf.	183	181	180
Major F. O. Nims.	176	187
Surgeon G. W. Flagg.	182
Adjutant Sumner Nims.	176	181
Hospital Steward J. M. Hovey.	171	189
Co. F.			
Captain C. H. Pitman.	174	184
Lieutenant A. Garland.	179	....
Lieutenant H. L. Bickford.	177	185
Sergeant G. F. Davis.	173	182
Sergeant C. E. Peabody.	180
Private T. E. Butler.	174	....
Private J. H. Hersey.	180
Private H. C. Wentworth.	180
Private W. T. Wentworth.	184
Co. G.			
Lieutenant F. C. Foster.	176	194
Lieutenant J. J. Colony.	170	182
Sergeant E. M. Keyes.	185	182	188
Sergeant J. C. Reed.	173	181
Corporal C. T. Colony.	170	184	183
Corporal O. H. Holbrook.	171	183
Private C. H. Clark.	187	199	....
Private Geo A. Quilty.	179	182	....
Private F. P. Gaynor.	171	182
Private Wm. B. Hills.	182	202
Private E. S. Osgood.	175	....
Private E. W. Gustine.	172	....
Private H. R. Beals.	174	....
Private F. W. Walker.	188
Private L. A. Piper.	188
Private H. W. Keyes.	172	183	191

MARKSMEN. — *Continued.*

FIRST BRIGADE.

	SCORES.		
	1888.	1889.	1890.
<i>Co. H.</i>			
Captain J. P. Wellman.....	.....	181	183
Captain E. A. Shaw.....	172	183	191
Lieutenant F. E. Barrett.....	.....	171	182
Sergeant J. C. Faulkner.....	.....	178	188
Sergeant T. A. Smith.....	.....	170	182
Sergeant P. F. Babbidge.....	.....	170	181
Corporal A. O. Dexter.....	.....	174	182
Corporal W. C. Howes.....	.....	175	.....
Corporal W. E. Wright.....	.....	181	190
Private F. N. Barker.....	.....	176	181
Private H. S. Foster.....	.....	171	.....
Private A. W. Green.....	.....	176	181
Private J. F. Moore.....	.....	175	191
Private J. H. Plum.....	.....	186	186
Private C. H. Tenney.....	.....	174	181
Private Giles Taintor.....	.....	187	.....
Private Chas. Taintor.....	.....	.....	182
Private C. F. Barker.....	.....	.....	180
Private A. E. Bissell.....	.....	.....	182
<i>Co. I.</i>			
Lieutenant W. H. Goodspeed.....	.....	173	182
Lieutenant W. R. Seaman.....	.....	176	182
Sergeant F. H. Thompson.....	.....	178	183
Sergeant F. M. Kelley.....	.....	180	184
Corporal M. H. Degnan.....	.....	186	187
Private H. P. Valcour.....	.....	180	191
THIRD REGIMENT.			
Lieutenant A. M. Dodge, Quartermaster.....	173	172	.....
<i>Co. F.</i>			
Captain C. W. Coolidge.....	.....	174	.....
Sergeant E. M. Drake.....	.....	173	.....
Corporal L. S. Gray.....	.....	171	.....
Corporal F. T. Davis.....	.....	170	.....
Private W. E. Crawford.....	.....	170	.....
Private J. T. Ballou.....	.....	177	.....
<i>Co. G.</i>			
Captain E. S. Downs.....	182	174	.....
Lieutenant G. A. Freeto.....	180	177	.....
Lieutenant B. M. Reynolds.....	175	.....	.....
Sergeant E. H. Plummer.....	180	174	.....
Corporal A. W. Buckwell.....	171	.....	.....
Corporal G. Poland.....	.....	174	.....
<i>Co. H.</i>			
Sergeant A. W. Rollins.....	175	.....	.....
Corporal F. Gomo.....	.....	176	.....
Musician F. W. Clough.....	175	175	.....

MARKSMEN OF FIRST CLASS.

Highest possible score, 150. Requirements for qualification, 60 at 200 yards, 60 at 300 yards. Insignia of this class, buttons, to be worn on the collar of coat.

	SCORES.			
	1887.	1888.	1889.	1890.
BRIGADE STAFF.				
Major H. B. Cilley, I. R. P.....	124	....	128	127
Sergeant C. W. Lovejoy, N. C. S.....	123	....
FIRST REGIMENT.				
<i>Co. A.</i>				
Captain Geo. H. Demeritt.....	122
Lieutenant F. E. Rollins.....	125
Sergeant W. H. Foss.....	126
Corporal James Hathaway.....	122
Corporal F. H. Keenan.....	124
Private L. H. Stenerwald.....	128
<i>Co. C.</i>				
Sergeant N. H. Roberts.....	121
Sergeant H. D. Gould.....	120
Corporal G. W. Kimball.....	122
Private E. L. Rose.....	120
<i>Co. D.</i>				
Sergeant David Robinson.....	121	120
<i>Co. E.</i>				
Lieutenant Frank W. Tibbetts.....	138
Private Harry Rogers.....	128
Private C. E. Jeffrey.....	123
SECOND REGIMENT.				
Colonel A. W. Metcalf.....	121	....	120	120
Major F. O. Nims.....	122	126
Surgeon G. W. Flagg.....	122	122
Adjutant Sumner Nims.....	122	121
Hospital Steward J. M. Hovey.....	121	126
<i>Co. E.</i>				
Captain G. Ira Berry.....	125
<i>Co. F.</i>				
Captain C. H. Pitman.....	120	....	120
Lieutenant A. Garland.....	126	....
Lieutenant H. L. Bickford.....	123	123
Sergeant G. F. Davis.....	121	122
Sergeant C. E. Peabody.....	120
Private T. E. Butler.....	121	....
Private H. C. Wentworth.....	120	....
Private J. H. Hersey.....	120
Private W. T. Wentworth.....	122
<i>Co. G.</i>				
Lieutenant F. C. Foster.....	124	128
Lieutenant J. J. Colony.....	120	120
Sergeant E. M. Keyes.....	124	....	121	127
Sergeant J. C. Reed.....	122	121
Corporal C. T. Colony.....	120	125	120
Corporal O. H. Holbrook.....	121	122
Private C. H. Clark.....	123	132	....

MARKSMEN OF THE FIRST CLASS.—*Continued.*

	SCORES.			
	1887.	1888.	1889.	1890.
<i>Co. G.—Continued.</i>				
Private W. B. Hills.....	127	123	134
Private Geo. Quilty.....	120	121	....
Private H. R. Beals.....	123	....
Private F. P. Gaynor.....	120	122
Private H. W. Keyes.....	120	120	125
Private B. S. Osgood.....	120	....
Private E. W. Gustine.....	121	....
Private F. W. Walker.....	124
Private L. A. Piper.....	123
<i>Co. H.</i>				
Captain J. P. Wellman.....	121	123
Captain E. A. Shaw.....	121	124	128
Lieutenant F. E. Barrett.....	120	120
Sergeant J. C. Faulkner.....	125	125
Sergeant T. A. Smith.....	120	122
Sergeant P. F. Babbidge.....	121	121
Corporal A. O. Dexter.....	120	120
Corporal W. C. Howes.....	121	....
Corporal W. E. Wright.....	121	129
Private F. N. Barker.....	121	121
Private H. S. Foster.....	122	....
Private A. W. Green.....	122	121
Private J. F. Moore.....	122	126
Private J. H. Plum.....	122	125
Private C. H. Tenney.....	122	120
Private Giles Taintor.....	127	....
Private Chas. Taintor.....	122
Private C. F. Barker.....	120
Private A. E. Bissell.....	121
<i>Co. I.</i>				
Lieutenant W. H. Goodspeed.....	120	122
Lieutenant W. R. Seaman.....	122	121
Sergeant F. H. Thompson.....	120	123
Sergeant F. M. Kelley.....	127	124
Corporal M. H. Degnan.....	132	126
Private H. P. Valcour.....	122	130
THIRD REGIMENT.				
Lieutenant A. M. Dodge, Quartermaster..	120	....	120	....
<i>Co. C.</i>				
Captain W. C. Trenoweth.....	129
Sergeant W. H. Chick.....	125
Private W. C. Hammond.....	123
Private J. F. Goodnough.....	126
Private A. M. Stearns.....	123	....	....	....
Private G. H. Trenoweth.....	122
<i>Co. D.</i>				
Captain F. F. Hill.....	124	....	....
Sergeant F. W. Wheeler.....	125	....	....
<i>Co. F.</i>				
Captain C. W. Coolidge.....	123	....
Sergeant E. M. Drake.....	120	....
Corporal L. S. Gray.....	121	....
Corporal F. T. Davis.....	121	....
Private W. E. Crawford.....	120	....
Private J. T. Ballou.....	124	....

MARKSMEN OF THE FIRST CLASS.—*Continued.*

	SCORES.			
	1887.	1888.	1889.	1890.
<i>Co. G.</i>				
Captain E. S. Downs.....	122	121	....
Lieutenant G. A. Freeto.....	122	126	....
Lieutenant B. M. Reynolds.....	122	....	....
Sergeant E. H. Plummer.....	125	120	....
Corporal G. Poland.....	124	121	....
Corporal A. W. Buckwell.....	120	....	....
<i>Co. H.</i>				
Sergeant A. W. Rollins.....	122	....	....	....
Musician F. W. Clough.....	122	122	....
Corporal F. Gomo.....	122	....

MARKSMEN OF THE SECOND CLASS.

Highest possible score, 75. Requirements for qualification, three scores, aggregating 51 at 300 yards. Insignia of this class, buttons with figure "2," to be worn on collar of coat.

	SCORES.			
	1887.	1888.	1889.	1890.
BRIGADE STAFF.				
Major H. B. Cilley, I. R. P.....	61	57	65	61
Sergeant C. W. Lovejoy, N. C. S.....	63	..
FIRST REGIMENT.				
<i>Co. A.</i>				
Captain G. H. Demeritt.....	52	..	..	61
Lieutenant F. E. Rollins.....	61
Sergeant W. H. Foss.....	55	..	..	61
Corporal James Hathaway.....	60
Corporal Frank H. Keenan.....	60
Private F. H. Burns.....	..	58	..	..
Private L. H. Stenerwald.....	64
<i>Co. C.</i>				
Sergeant N. H. Roberts.....	56	61
Sergeant E. P. Carr.....	59
Sergeant C. B. Carr.....	52
Sergeant H. D. Gould.....	54
Corporal G. W. Kimball.....	55	62
Corporal G. P. Bennett.....	51
Private G. M. Taylor.....	59	..
Private E. S. Snow.....	51
Private E. L. Rose.....	60
<i>Co. D.</i>				
Sergeant D. Robinson.....	61	60
Sergeant M. E. Stiles.....	57	..
Corporal G. W. Ham.....	54	..	..	..
Musician F. Tibbetts.....	57	..
Private C. Hanson.....	53	..
Private W. J. Drew.....	54	..
<i>Co. E.</i>				
Lieutenant F. W. Tibbetts.....	68
Private Harry Rogers.....	55	63
Private C. E. Jeffrey.....	62
SECOND REGIMENT.				
Colonel A. W. Metcalf.....	60	..	60	60
Major F. O. Nims.....	..	52	60	60
Surgeon G. W. Flagg.....	61	62
Assistant-Surgeon W. H. Nute.....	54	..
Adjutant Sumner Nims.....	..	51	60	60
Com. Sergeant F. H. Weeks.....	53	..
Hospital Steward J. M. Hovey.....	61	65
<i>Co. C.</i>				
Lieutenant A. D. Farley.....	58	..
Private H. Long.....	53	..
<i>Co. E.</i>				
Captain G. Ira Berry.....	..	54	..	62
Private Carlos Pearl.....	54

MARKSMEN OF THE SECOND CLASS. — *Continued.*

	SCORES.			
	1887.	1888.	1889.	1890.
<i>Co. F.</i>				
Captain C. H. Pitman.....	60	..	..	61
Lieutenant A. Garland.....	61	..
Lieutenant H. L. Bickford.....	63	62
Corporal W. S. Hayes.....	57	..	..	..
Corporal G. F. Davis.....	53	..	60	61
Corporal H. J. Pike.....	52
Private C. E. Peabody.....	..	53	..	60
Private T. E. Butler.....	60	..
Private H. C. Wentworth.....	60	..
Private F. S. Gilmore.....	55
Private J. H. Hersey.....	60
Private E. Randall.....	60
Private C. C. Ricker.....	63
Private W. T. Wentworth.....	62
<i>Co. G.</i>				
Lieutenant F. C. Foster.....	62	65
Lieutenant J. J. Colony.....	..	57	60	60
Sergeant E. M. Keyes.....	60	..	60	64
Sergeant J. C. Reed.....	52	..	60	61
Corporal C. T. Colony.....	..	60	62	60
Corporal O. H. Holbrook.....	61	61
Private F. W. Walker.....	54	..	..	61
Private B. H. Whitehouse.....	53	..	..	..
Private W. J. Bass.....	..	53	..	..
Private C. H. Clark.....	..	63	66	..
Private H. W. Eastman.....	..	51	..	..
Private F. P. Gaynor.....	..	53	60	62
Private W. B. Hills.....	..	66	62	66
Private N. J. McDonald.....	..	51	..	55
Private F. F. Page.....	..	52	..	..
Private G. A. Quilty.....	..	60	60	..
Private C. W. Shaw.....	..	58	..	..
Private H. R. Beals.....	62	..
Private E. W. Gustine.....	61	..
Private H. W. Keyes.....	54	60	60	60
Private W. L. Mason.....	56	..
Private B. S. Osgood.....	60	..
Private G. F. Little.....	58
Private L. A. Piper.....	60
<i>Co. H.</i>				
Captain J. P. Wellman.....	..	54	60	63
Captain E. A. Shaw.....	..	61	61	62
Lieutenant F. E. Barrett.....	..	51	60	60
Lieutenant A. W. Buckminster.....	51	..
Sergeant F. C. Nims.....	..	52	..	..
Sergeant T. A. Smith.....	..	54	60	62
Sergeant J. C. Faulkner.....	61	60
Sergeant P. F. Babbidge.....	61	60
Private A. E. Bissell.....	..	58	..	60
Private C. H. Tenney.....	..	53	60	60
Private F. N. Barker.....	61	60
Private C. F. Barker.....	57	60
Corporal W. E. Wright.....	..	58	60	62
Corporal A. G. Isham.....	52	..
Corporal A. O. Dexter.....	60	60
Corporal W. C. Howes.....	61	58
Private H. S. Foster.....	60	..
Private A. W. Green.....	60	60
Private George Hirsch.....	57	..

MARKSMEN OF THE SECOND CLASS.—*Continued.*

	SCORES.			
	1887.	1888.	1889.	1890.
<i>Co. II.—Continued.</i>				
Private H. A. King.....	57	..
Private J. F. Moore.....	61	61
Private C. Parker, Jr.....	55	..
Private J. H. Plum.....	61	61
Private Giles Taintor.....	62	..
Private Charles Taintor.....	62
<i>Co. I.</i>				
Lieutenant W. H. Goodspeed.....	60	61
Lieutenant W. R. Seaman.....	62	60
Sergeant F. H. Thompson.....	60	61
Sergeant F. M. Kelley.....	60	60
Corporal M. H. Degnan.....	63	60
Private D. T. Bliss.....	55	..
Private H. P. Valcour.....	62	65
THIRD REGIMENT.				
Lieutenant A. M. Dodge, Quartermaster..	60	..	60	..
Lieutenant C. B. Randlett, Adjutant.....	54	..
Sergt. Jos. S. Matthews, N. C. S.....	53	..
<i>Co. C.</i>				
Captain W. C. Trenoweth.....	55	65
Sergeant F. C. Heard.....	56
Sergeant A. L. Trenoweth.....	58
Sergeant W. H. Chick.....	60
Private F. R. Roach.....	52	..	..	..
Private W. C. Hammond.....	60
Private F. Purnont.....	56
Private J. F. Goodnough.....	64
Private A. M. Stearns.....	60	..	..	..
Private George H. Trenoweth.....	61
<i>Co. D.</i>				
Captain F. F. Hill.....	..	61	..	..
Lieutenant D. H. Merrill.....	..	54	..	..
Sergeant F. W. Wheeler.....	..	61	..	..
Private E. M. Locke.....	..	55	..	..
Private A. T. Locke.....	..	55	..	..
Private E. B. Drake.....	..	54	..	..
<i>Co. F.</i>				
Captain C. W. Coolidge.....	62	..
Sergeant E. M. Drake.....	60	..
Sergeant E. M. Welch.....	59	..
Corporal L. S. Gray.....	60	..
Corporal F. T. Davis.....	61	..
Private W. E. Crawford.....	60	..
Private J. T. Ballou.....	63	..
<i>Co. G.</i>				
Captain E. S. Downs.....	55	62	61	..
Lieutenant G. A. Freeto.....	56	62	65	..
Lieutenant B. M. Reynolds.....	53	63	55	..
Sergeant E. H. Plummer.....	..	65	60	..
Sergeant G. F. Randlett.....	53	..
Corporal G. Poland.....	51	64	61	..
Corporal A. W. Buckwell.....	52	60	53	..
Private N. Rock, Jr.....	53	..
Private C. Rich.....	51	..
Private H. Thompson.....	51	..

MARKSMEN OF THE SECOND CLASS.—*Continued.*

	SCORES.			
	1887.	1888.	1889.	1890.
<i>Co. H.</i>				
Sergeant A. W. Rollins.....	61	..	..	..
Corporal F. Gomo.....	53	..	61	..
Musician F. W. Clough.....	..	60	61	..
Private J. W. Peterson.....	..	55	..	..
TROOP A, CAVALRY.				
Captain E. H. Smith.....	58	..	..	..
Bugler F. H. Weston.....	52	..	..	..
Private C. E. Sweatt.....	51	..	..	..
FIRST LIGHT BATTERY.				
Sergeant F. B. Stevens.....	..	..	..	51
Private H. Wingate.....	..	..	..	56
Private E. H. Smith.....	..	..	..	51
Private F. Morrill.....	..	..	..	55
Private W. Davidson.....	..	..	..	57

MARKSMEN OF THIRD CLASS.

Highest possible score, 75. Requirements for qualification, three scores of 17 each at 200 yards. Insignia of this class, buttons with figure "3," to be worn on collar of coat.

	SCORES.				
	1886.	1887.	1888.	1889.	1890.
BRIGADE STAFF.					
Major H. B. Cilley, I. R. P.....	57	63	56	63	66
Bugler H. A. Brown, N. C. S.....	51	..	..	..	..
Captain F. L. Kimball, A. D. C.....	..	..	..	60	..
Sergeant C. W. Lovejoy, N. C. S.....	..	..	..	54	..
FIRST REGIMENT.					
Colonel G. M. L. Lane.....	..	..	..	..	51
H. S. C. H. Harvey.....	..	..	..	..	52
<i>Co. A.</i>					
Captain G. H. Demeritt.....	..	51	..	..	61
Sergeant W. H. Foss.....	..	53	..	56	65
Sergeant W. H. Tibbetts.....	..	51	..	..	..
Corporal Frank Keenan.....	..	..	..	52	64
Lieutenant F. E. Rollins.....	..	..	..	52	64
Lieutenant C. S. Clifford.....	..	..	..	..	52
Private L. Stenerwald.....	..	..	..	54	64
Corporal James Hathaway.....	..	..	..	..	62
Corporal Edward Grimes.....	..	..	..	..	62
Corporal F. E. Russ.....	..	..	..	..	54
Private Anton Nelson.....	..	..	..	..	53
Private P. J. Markey.....	..	..	..	..	54
Private H. A. Hadley.....	..	..	..	..	51
Private H. E. Hodgdon.....	..	..	..	..	56
Sergeant E. D. Smith.....	..	..	..	..	51
Private S. E. Welch.....	..	..	..	..	52
Private Frank McCabe.....	..	..	..	..	54
<i>Co. C.</i>					
Captain P. W. Pattee.....	64	..	..	..	..
Sergeant E. P. Carr.....	66	54	..	..	..
Sergeant N. H. Roberts.....	..	..	51	56	60
Corporal C. B. Carr.....	64	..	..	..	..
Corporal G. W. French.....	63	..	..	..	..
Corporal Geo. W. Kimball.....	60	52	..	60	60
Corporal G. P. Bennett.....	..	..	..	54	60
Sergeant H. D. Gould.....	..	..	54	..	60
Musician O. L. Richardson.....	60	..	..	..	..
Private J. A. Richards.....	57	..	..	..	..
Private F. E. Willard.....	56	..	..	..	..
Private G. W. Bennett.....	..	..	..	51	54
Private E. L. Rose.....	..	..	..	53	60
Private G. M. Taylor.....	..	..	..	55	..
Private A. E. Snow.....	..	..	..	..	51
Private A. S. Tirrell.....	..	..	..	..	52
<i>Co. D.</i>					
Lieutenant C. F. Sawyer.....	..	..	..	54	51
Sergeant M. E. Stiles.....	..	..	..	56	51
Corporal G. W. Ham.....	..	60	..	..	..
Corporal David Robinson.....	..	..	57	60	60
Musician F. Tibbetts.....	..	..	..	54	..
Private T. Agnew.....	..	..	..	52	..
Private W. J. Drew.....	..	..	..	60	..
Private C. Hanson.....	..	..	..	54	..
Private E. Pitts.....	..	..	..	..	54

MARKSMEN OF THIRD CLASS.—*Continued.*

	SCORES.				
	1886.	1887.	1888.	1889.	1890.
<i>Co. E.</i>					
Lieutenant F. W. Tebbetts.....	..	..	..	..	70
Sergeant G. D. Sanders.....	55	..	..	..	..
Corporal W. W. Dickey.....	51	..	..	..	..
Private L. Schwarz.....	52	..	..	..	..
Private Harry Rogers.....	..	..	51	54	65
Private C. E. Jeffrey.....	..	..	..	..	61
<i>Co. F.</i>					
Sergeant Chas. S. Gillespie.....	..	..	..	..	51
<i>Co. H.</i>					
Lieutenant T. Raiche.....	..	..	..	..	54
Sergeant M. Maynard.....	..	..	..	..	53
Corporal O. Ouilette.....	..	..	..	..	56
Corporal O. Gaudet.....	..	..	..	..	57
<i>Co. K.</i>					
Private Timothy Sheehan.....	..	..	..	..	56
SECOND REGIMENT.					
Colonel A. W. Metcalf.....	57	61	..	60	60
Major F. O. Nims.....	..	..	54	62	66
Surgeon G. W. Flagg.....	..	..	..	61	60
Asst. Surgeon W. H. Nute.....	..	..	..	58	..
Adjutant Sumner Nims.....	..	..	54	62	61
Com. Sergt. F. H. Weeks, N.C.S.	..	..	..	54	53
Hosp. Stew'd J. M. Hovey, N.C.S.	..	..	..	60	61
<i>Co. C.</i>					
Lieutenant A. D. Farley.....	..	..	..	55	..
Sergeant C. D. Seaver.....	51	..	..	..	..
Sergeant W. J. Elliot.....	..	..	..	51	..
Corporal G. E. Richardson.....	..	51	..	..	53
Private W. E. Hutchins.....	55	..	..	..	..
Private N. W. Dickerson.....	52	..	..	..	..
Private Henry F. Long.....	..	..	..	56	56
Private John Shea.....	..	..	..	58	..
<i>Co. E.</i>					
Captain G. Ira Berry.....	57	..	59	62	63
Corporal J. W. Dockery.....	..	..	65	..	..
Private A. A. Chesley.....	..	..	53	..	..
Private F. B. Foss.....	..	..	54	..	..
Private Carlos Pearl.....	..	..	57	..	..
Private Ellsworth Pearl.....	..	..	61	..	..
Private C. H. Cole.....	..	..	..	..	54
Private W. W. Leighton.....	..	..	..	..	55
<i>Co. F.</i>					
Captain C. H. Pitman.....	53	52	60	57	60
Lieutenant G. F. Davis.....	55	..	..	65	..
Lieutenant H. L. Bickford.....	..	..	..	60	61
Sergeant G. F. Davis.....	51	61	54	..	61
Sergeant C. E. Peabody.....	..	..	52	53	60
Sergeant J. F. Avery.....	..	..	..	53	..
Corporal W. S. Hayes.....	52	..	54	53	..
Corporal G. E. Moulton.....	..	55	..	..	..
Corporal H. J. Pike.....	..	..	..	..	55
Private F. J. Hutchins.....	..	..	52	..	..
Private H. C. Wentworth.....	..	..	56	60	57

MARKSMEN OF THIRD CLASS.—*Continued.*

	SCORES.				
	1886.	1887.	1888.	1889.	1890.
<i>Co. F.—Continued.</i>					
Private F. J. Tibbetts	57	..	..
Private John Whitehouse.....	57	61	..
Private T. E. Butler.....	61	..
Private A. N. Davis.....	53	..
Private J. H. Hersey.....	53	60
Private F. S. Gilmore.....	60
Private J. F. Place.....	55
Private E. Randall.....	59
Private C. C. Ricker.....	55
Private H. S. Rollins.....	51
Private W. T. Wentworth.....	60
<i>Co. G.</i>					
Captain E. O. Upham.....	54	..	56
Lieutenant F. C. Foster.....	57	..	..	62	63
Lieutenant J. J. Colony.....	59	60	60
Sergeant E. M. Keyes.....	64	62	..	61	63
Sergeant J. C. Reed.....	55	..	..	62	60
Sergeant D. H. Dickinson.....	52	..	55
Corporal C. T. Colony.....	60	63	60
Corporal O. H. Holbrook.....	60	61
Private Bion Whitehouse.....	54	..	..	..	..
Private F. W. Walker.....	..	53	..	..	63
Private W. J. Bass.....	53	..	..
Private C. H. Clark.....	63	66	..
Private H. W. Eastman.....	59	..	..
Private F. P. Gaynor.....	60	60	60
Private W. B. Hills.....	61	61	68
Private E. A. Mitchell.....	55	..	..
Private N. J. McDonald.....	51	..	61
Private F. F. Page.....	55	..	..
Private George Quilty.....	60	61	..
Private C. W. Shaw.....	60	..	..
Private E. F. Smith.....	54	..	..
Private C. L. Seavey.....	51	..	..
Private H. R. Beals.....	61	..
Private G. H. Butler.....	57	..
Private C. W. Buckminster.....	54	..
Private E. W. Gustine.....	60	..
Private H. W. Keyes.....	52	..	..	60	65
Private G. F. Little.....	51	59
Private W. L. Mason.....	60	..
Private B. S. Osgood.....	60	..
Private C. E. Tottingham.....	53	55
Private L. A. Piper.....	63
<i>Co. H.</i>					
Captain J. P. Wellman.....	56	61	60
Captain E. A. Shaw.....	..	54	..	63	66
Lieutenant F. E. Barrett.....	54	60	60
Lieutenant A. W. Buckminster..	51	56
Sergeant F. C. Nims.....	53	..	..
Sergeant A. G. Isham.....	52	..	..
Sergeant G. A. Moxham.....	58	57	..
Sergeant T. A. Smith.....	60	60	60
Sergeant P. F. Babbidge.....	60	61
Corporal A. O. Dexter.....	56	60	60
Corporal W. E. Wright.....	56	61	67
Corporal W. C. Howes.....	60	60
Private W. J. Ruffle.....	..	57	..	..	..
Private H. L. Kellogg.....	..	53	..	..	..

MARKSMEN OF THIRD CLASS. — *Continued.*

	SCORES.				
	1886.	1887.	1888.	1889.	1890.
<i>Co. H. — Continued.</i>					
Private A. E. Bissell.....	61	53	61
Private G. W. Stoddard.....	51	..	..
Private C. H. Tenney.....	51	62	60
Sergeant J. C. Faulkner.....	64	65
Private F. N. Barker.....	60	61
Private C. F. Barker.....	52	60
Private A. W. Blanchard.....	54	..
Private E. B. Carpenter.....	54	..
Private C. W. Emerson.....	55	..
Private H. S. Foster.....	62	54
Private A. W. Green.....	62	61
Private Geo. Hirsch.....	60	..
Private H. A. King.....	58	..
Private J. F. Moore.....	61	65
Private Charles Parker, Jr.....	54	..
Private J. H. Plum.....	61	64
Private Giles Taintor.....	65	..
Private F. W. Wellington.....	60	..
Private Chas. Taintor.....	60
Corporal A. E. Lawrence.....	54	..	..
<i>Co. I.</i>					
Sergeant F. M. Kelley.....	52	67	64
Lieutenant W. H. Goodspeed.....	60	61
Lieutenant W. R. Seamen.....	60	61
Sergeant F. H. Thompson.....	52	60	62
Sergeant J. H. Moran.....	53	63
Corporal M. H. Degnan.....	..	55	61	69	66
Corporal H. T. Tessier.....	52
Private E. A. Allen.....	56	..
Private D. T. Bliss.....	53	..
Private P. H. Riley.....	55	..
Private H. P. Valcour.....	60	65
Private C. Wheeler.....	53	..
Private F. J. Walton.....	52	..
<i>Co. K.</i>					
Sergeant Reuben Gregg.....	53	..	..	..	..
Private T. M. Craig.....	57	..	..	..	..
THIRD REGIMENT.					
Quartermaster A. M. Dodge.....	55	60	..	60	..
Adjutant C. B. Randlett.....	62	..
Q. Sergt. J. S. Matthews, N. C. S.	52	..	..
<i>Co. A.</i>					
Private J. F. Hayes.....	53	..
Private C. F. Putney.....	51	..
<i>Co. C.</i>					
Captain W. C. Trenoweth.....	63	..	..	..	64
Lieutenant H. B. Roby.....	52	..	..	..	..
Lieutenant T. P. Davis.....	56
Sergeant W. H. Chick.....	52	64
Sergeant A. L. Trenoweth.....	58
Corporal F. C. Hard.....	57	..	55
Corporal J. H. Smith.....	56	55
Corporal A. Frazier.....	51	58
Private E. R. Roach.....	55	..	..	..	..
Private E. W. Dutton.....	53	..	..

MARKSMEN OF THIRD CLASS. — *Continued.*

	SCORES.				
	1886.	1887.	1888.	1889.	1890.
<i>Co. C. — Continued.</i>					
Private S. F. Short.....	53	..
Private B. L. Nutting.....	54
Private Ben. Pride.....	60
Private W. C. Hammond.....	63
Private F. Purnont.....	54
Private J. F. Goodnough.....	62
Private A. M. Stearns.....	..	63	..	..	61
Private O. J. Nelson.....	58
Private G. H. Trenoweth.....	61
<i>Co. D.</i>					
Captain F. F. Hill.....	57	..	63	..	..
Lieutenant D. H. Merrill.....	58	..	..
Sergeant F. W. Brown.....	55	..	..	..	..
Corporal F. W. Wheeler.....	55	..	64	..	..
Corporal E. C. Sanborn.....	55	..	..	..	..
Corporal L. H. Harvey.....	52	..	..
Private E. B. Drake.....	58	..	..	..	..
Private D. D. Hardscord.....	59	..	..	..	..
Private F. E. Newell.....	56	..	..	..	..
Private A. T. Locke.....	..	53	..	..	..
Private E. M. Locke.....	61	..	..
<i>Co. F.</i>					
Captain C. W. Coolidge.....	61	..
Sergeant E. M. Drake.....	60	..
Sergeant E. M. Welch.....	60	..
Sergeant E. W. Townes.....	55	..
Sergeant E. N. Foster.....	54	..
Corporal L. S. Gray.....	61	..
Corporal F. T. Davis.....	60	..
Private J. T. Ballou.....	61	..
Private W. E. Crawford.....	60	..
Private A. J. Gove.....	57	..
Private F. S. Welch.....	57	..
Private F. P. Kenney.....	53	..
Private F. L. King.....	53	..
<i>Co. G.</i>					
Captain E. S. Downs.....	..	54	60	60	..
Lieutenant G. A. Freeto.....	..	60	57	61	..
Lieutenant B. M. Reynolds.....	..	52	62	60	..
Sergeant E. Plummer.....	..	56	63	60	..
Sergeant G. F. Randlett.....	..	55	54	53	..
Corporal G. Poland.....	..	56	58	60	..
Corporal A. W. Buckwell.....	..	60	56	60	..
Corporal P. B. Smith.....	..	53	..	..	..
Private F. Bell.....	..	55	..	..	..
Private N. Rock, Jr.....	58	..
Private C. Rich.....	53	..
Private H. Thompson.....	54	..
<i>Co. H.</i>					
Sergeant A. W. Rollins.....	61	..	..	61	..
Sergeant S. C. Miller.....	54	..	..	..	..
Sergeant J. D. Kirk.....	52	..
Corporal Fred Gomo.....	59	..	60	61	..
Musician F. W. Clough.....	62	61	..
Private J. W. Peterson.....	..	52	54	..	..
Private L. E. Bennett.....	62	..	..
Private W. J. Moulton.....	56	..	..

MARKSMEN OF THIRD CLASS. — *Continued.*

	SCORES.				
	1886.	1887.	1888.	1889.	1890.
<i>Co. H. — Continued.</i>					
Private E. J. Judkins.....	60	..	..
Private J. E. Long.....	52	..	..
Private Thomas Hill.....	53	..	..
TROOP A, CAVALRY.					
Captain E. H. Smith.....	56	56	..	..	..
Lieutenant C. H. Durton.....	55	56	..
Bugler F. H. Weston.....	..	54	..	..	..
Private C. E. Sweatt.....	52	54	..	..	..
Private F. A. Wilson.....	57	58	..
Private Gilman Foote.....	54	..	..
Private A. J. Powers.....	57	52	..
FIRST LIGHT BATTERY.					
Lieutenant J. A. Barker.....	..	58	..	..	57
Sergeant F. W. Wilson.....	52
Sergeant J. B. Nourse.....	53
Sergeant F. B. Stevens.....	58
Corporal O. P. Stone.....	55
Private E. H. Smith.....	..	58	..	..	56
Private A. Puffer.....	52
Private F. Morrill.....	53
Private W. Bartlett.....	53
Private O. A. Manning.....	53
Private E. V. Rowe.....	55
Private W. Seaward.....	55
Private A. E. Eastman.....	53
Private H. Wingate.....	59
Private A. H. Seaver.....	52
Private U. L. George.....	56
Private J. Currier.....	51
Private W. Davidson.....	54
Private H. Johnson.....	54
Private F. Robie.....	55

RETURN

OF THE

NEW HAMPSHIRE NATIONAL GUARD.

	Commissioned Officers.	Enlisted Men.	Aggregate.
Commander-in-Chief and Staff.....	11	.....	11
Brigade Commander and Staff.....	10	4	14

FIRST REGIMENT.—HEADQUARTERS, MANCHESTER.

Field and Staff.....	9	4	13
Band.....	..	24	24
Co. A, Dover.....	3	36	39
Co. B, Manchester.....	3	38	41
Co. C, Manchester.....	1	54	55
Co. D, Dover.....	2	35	37
Co. E, Manchester.....	3	35	38
Co. F, Derry.....	3	39	42
Co. H, Manchester.....	2	37	39
Co. K, Manchester.....	2	36	38
Strength of First Regiment.....	28	338	366

SECOND REGIMENT. — HEADQUARTERS, KEENE.

	Commissioned Officers.	Enlisted Men.	Aggregate.
Field and Staff.....	9	5	14
Band.....	..	24	24
Co. C, Nashua.....	3	39	42
Co. D, Milford.....	3	45	48
Co. E, Rochester.....	2	47	49
Co. F, Farmington.....	3	35	38
Co. G, Keene.....	3	35	38
Co. H, Keene.....	3	37	40
Co. I, Nashua.....	3	39	42
Co. K, Nashua.....	3	48	51
Strength of Second Regiment.....	31	354	386

THIRD REGIMENT. — HEADQUARTERS, CONCORD.

Field and Staff.....	9	4	13
Band.....	..	24	24
Co. A, New London.....	3	39	42
Co. C, Concord.....	3	43	46
Co. D, Pittsfield.....	3	38	41
Co. E, Concord.....	3	40	43
Co. F, Bristol.....	3	40	43
Co. G, Lebanon.....	3	36	39
Co. H, Franklin Falls.....	3	38	41
Strength of Third Regiment.....	30	302	33

CAVALRY.

	Commissioned Officers.	Enlisted Men.	Aggregate.
Troop A, Peterborough.....	3	55	58
Strength of Cavalry	3	55	58

ARTILLERY.

First Battery, Manchester.....	4	68	72
Strength of Artillery	4	68	72

RECAPITULATION.

Commander-in-Chief and Staff.....	11	..	11
Brigade Commander and Staff.....	10	4	14
Infantry.....	90	994	1,084
Cavalry.....	3	55	58
Artillery.....	4	68	72
Total.....	118	1,121	1,239

REGISTER

OF THE

NEW HAMPSHIRE NATIONAL GUARD.

HIS EXCELLENCY HIRAM A. TUTTLE, *Governor and Commander-in-Chief.*

INAUGURATED JANUARY 8, 1891.

GENERAL STAFF.

NAME.	Rank.	Residence.	Date of Commission.
Augustus D. Ayling, Adj. Gen..	Maj. Gen.....	Concord.....	July 15, 1879
Albert N. Dow, Insp. Gen.....	Brig. Gen....	Exeter.....	March 5, 1891
Charles W. Stevens, Q. M. Gen..	Brig. Gen....	Nashua.....	Jan. 28, 1891
Oliver A. Gibbs, Com. Gen.....	Brig. Gen....	Dover.....	Jan. 28, 1891
Charles H. Bartlett, J. A. Gen ..	Brig. Gen....	Manchester...	Jan. 28, 1891
Ferdinand A. Stillings, Surg. Gen.....	Brig. Gen....	Concord.....	Jan. 28, 1891
Arthur E. Clarke, Aid-de-Camp.	Colonel.....	Manchester...	Jan. 28, 1891
George A. Sanders, "	Colonel.....	Laconia.....	Jan. 28, 1891
Frank W. Maynard, "	Colonel.....	Nashua.....	Jan. 28, 1891
Rufus N. Elwell, "	Colonel.....	Exeter.....	Jan. 28, 1891

FIRST BRIGADE.

NAME.	Rank.	Residence.	Date of Commission.
Joab N. Patterson.....	Brig. Gen....	Concord.....	May 15, 1889
Frank W. Rollins, Assistant Adjutant-General.....	Lieut. Col....	Concord.....	March 7, 1891
Charles E. Faxon, Assistant Inspector-General.....	Major.....	Nashua.....	Feb. 17, 1891
Jerry P. Wellman, Inspector Rifle Practice.....	Major.....	Keene.....	May 20, 1889
Irving A. Watson, Medical Director.....	Lieut. Col....	Concord.....	May 20, 1889
Arthur H. Chase, Judge Advocate.....	Major.....	Concord.....	Mar. 7, 1891
George R. Leavitt, Quarterm'r..	Captain.....	Laconia.....	May 20, 1889
Charles F. Sawyer, Commissary	Captain.....	Dover.....	April 16, 1891
Daniel H. Gienty, Aid-de-Camp.	Captain.....	Concord.....	April 15, 1886
Frank L. Kimball, Aid-de-Camp	Captain.....	Nashua.....	May 28, 1889

FIRST REGIMENT.

FIELD AND STAFF.

George M. L. Lane.....	Colonel.....	Manchester....	Dec. 21, 1886
Richard M. Scammon.....	Lieut. Col....	Exeter.....	Dec. 21, 1886
Miner G. Frye.....	Major.....	Derry Depot...	Mar. 31, 1891
Frank B. Perkins, Adjutant.....	First Lieut...	Manchester....	Feb. 24, 1890
Thomas W. Wilkinson, Q. M....	First Lieut...	Dover.....	Jan. 27, 1890
Harry E. Parker, Paymaster....	Captain.....	Manchester....	Mar. 3, 1890
Cornelius F. Starr, Asst. Surg...	Captain.....	Manchester....	May 29, 1891
Luther F. McKinney, Chaplain.	Captain.....	Manchester....	Jan. 10, 1887

COMPANY A.

George H. Demeritt.....	Captain.....	Dover.....	Sept. 1, 1881
Charles S. Clifford ..	First Lieut ..	Dover.....	May 16, 1887
Frank E. Rollins.....	Second Lieut	Dover.....	May 16, 1887

COMPANY B.

NAME.	Rank.	Residence.	Date of Commission.
Daniel F. Shea.....	Captain.....	Manchester....	Mar. 11, 1891
William Sullivan.....	First Lieut...	Manchester....	Aug. 30, 1890
Thomas J. Bresnahan.....	Second Lieut	Manchester....	Aug. 30, 1890

COMPANY C.

Louis Stevens.....	Captain.....	Manchester....	May 29, 1891
Wilber W. Dickey.....	First Lieut...	Manchester....	Oct. 8, 1891
George B. Rodgers.....	Second Lieut	Manchester....	June 6, 1891

COMPANY D.

Walter W. Scott.....	Captain.....	Dover.....	May 29, 1889
Louis Goldschmidt.....	First Lieut...	Dover.....	Oct. 28, 1889
Ned E. Styles.....	Second Lieut	Dover.....	June 4, 1891

COMPANY E.

Bartlett N. Wilson.....	Captain.....	Manchester....	April 13, 1887
Frank W. Tebbetts.....	First Lieut...	Manchester....	April 13, 1887
John B. Rogers.....	Second Lieut	Manchester....	May 18, 1888

COMPANY F.

Leighton H. McIntire.....	Captain.....	Derry Depot...	Dec. 15, 1887
Otis F. Campbell.....	First Lieut...	Derry Depot...	Dec. 18, 1889
Charles F. Gillespie.....	Second Lieut	Derry Depot...	April 8, 1891

COMPANY H.

Jerémie Soly.....	Captain.....	Manchester....	Dec. 16, 1889
Treflé Raiche.....	Second Lieut	Manchester....	Aug. 30, 1890

COMPANY K.

NAME.	Rank.	Residence.	Date of Commission.
Patrick H. O' Malley	Captain.....	Manchester....	Dec. 30, 1886
John Fitzmaurice.....	First Lieut...	Manchester....	May 13, 1890
Michael J. F. Ward	Second Lieut	Manchester....	June 12, 1891

SECOND REGIMENT.

FIELD AND STAFF.

Albert W. Metcalf.....	Colonel	Keene.....	Aug. 1, 1889
Jason E. Tolles.....	Lieut. Col...	Nashua	Aug. 1, 1889
Francis O. Nims.....	Major	Keene.....	Aug. 1, 1889
Sumner Nims, Adjutant.....	First Lieut...	Keene.....	Sept. 16, 1889
Eugene W. Emerson, Quart'm'r	First Lieut...	Farmington....	Sept. 16, 1889
Charles A. Roby, Paymaster	Captain.....	Nashua	Nov. 3, 1887
George W. Flagg, Surgeon.....	Major	Keene.....	May 10, 1886
William H. Nute, Asst. Surgeon	Captain.....	Farmington....	May 10, 1886
Henry B. Smith, Chaplain	Captain.....	Nashua	Sept. 16, 1889

COMPANY C.

Hiram S. Stevens.....	Captain.....	Nashua	Mar. 19, 1888
William H. Livingston.....	First Lieut...	Nashua	Feb. 23, 1891
Charles A. Poff.....	Second Lieut	Nashua	Feb. 23, 1891

COMPANY D.

Freeman C. Anderson.....	Captain.....	Milford	Jan. 27, 1891
Everett B. Coffin.....	First Lieut...	Milford	Jan. 27, 1891
Benton Mills.....	Second Lieut	Milford	Jan. 27, 1891

COMPANY E.

NAME.	Rank.	Residence.	Date of Commission.
G. Ira Berry	Captain.....	Rochester.....	Mar. 25, 1890
Fred E. Plummer.....	First Lieut...	Rochester.....	June 9, 1891
James Geddis	Second Lieut	Rochester.....	June 9, 1891

COMPANY F.

Charles H. Pitman.....	Captain.....	Farmington....	Feb. 25, 1887
Hosea L. Bickford.....	First Lieut...	Farmington....	Mar. 16, 1891
George F. Davis.....	Second Lieut	Farmington....	Mar. 16, 1891

COMPANY G.

Edwin O. Upham.....	Captain.....	Keene.....	July 24, 1890
John J. Colony	First Lieut...	Keene.....	Mar. 27, 1891
Eugene M. Keyes.....	Second Lieut	Keene.....	Mar. 27, 1891

COMPANY H.

Elbridge A. Shaw.....	Captain.....	Keene.....	Aug. 1, 1890
Fred E. Barrett	First Lieut...	Keene.....	Aug. 1, 1890
Albert W. Buckminster.....	Second Lieut	Keene.....	Aug. 1, 1890

COMPANY I.

Edwin H. Parmenter.....	Captain.....	Nashua	Sept. 1, 1889
Willis H. Goodspeed.....	First Lieut...	Nashua	May 23, 1887
William R. Seaman.....	Second Lieut	Nashua	May 23, 1887

COMPANY K.

Walter I. Blanchard.....	Captain.....	Nashua	Mar. 18, 1891
Samuel S. Spalding.....	First Lieut...	Nashua	Mar. 18, 1891
Charles W. Howard.....	Second Lieut	Nashua	Mar. 18, 1891

THIRD REGIMENT.

FIELD AND STAFF.

NAME.	Rank.	Residence.	Date of Commission.
True Sanborn, Jr.....	Colonel	Chichester.....	May 15, 1889
Nathan H. Randlett.....	Lieut. Col....	Lebanon.....	May 15, 1889
George N. Cheever.....	Major	Franklin.....	Mar. 11, 1891
Clarence B. Randlett, Adjutant.	First Lieut...	Concord.....	May 22, 1889
Arthur M. Dodge, Quarterm'r ..	First Lieut...	Tilton.....	May 22, 1889
William Tutherly, Paymaster ..	Captain.....	Claremont....	May 22, 1889
Frank T. Moffett, Surgeon	Major	Littleton	May 22, 1889
Robert Burns, Asst. Surgeon....	Captain.....	Plymouth	May 22, 1889
James K. Ewer, Chaplain.....	Captain.....	Concord.....	May 22, 1889

COMPANY A.

Baxter Gay.....	Captain.....	New London ..	Feb. 25, 1891
Frank P. Messer.....	First Lieut...	New London ..	Feb. 25, 1891
Edwin F. Hastings.....	Second Lieut	New London ..	Feb. 25, 1891

COMPANY C.

William C. Trenoweth	Captain.....	Concord.....	Sept. 16, 1889
Thomas P. Davis	First Lieut...	Concord.....	Feb. 26, 1891
Alfred L. Trenoweth.....	Second Lieut	Concord.....	Feb. 26, 1891

COMPANY D.

Forest F. Hill.	Captain.....	Pittsfield	July 3, 1888
Delta H. Merrill.....	First Lieut...	Pittsfield	Nov. 17, 1890
Edwin B. Drake.....	Second Lieut	Pittsfield	Nov. 17, 1890

COMPANY E.

Harry B. Brown.....	Captain.....	Concord.....	April 14, 1891
George D. Waldron.....	First Lieut...	Concord.....	April 14, 1891
Harry P. Hammond	Second Lieut	Concord.....	April 14, 1891

COMPANY F.

NAME.	Rank.	Residence.	Date of Commission.
Orrin B. Ray	Captain.....	Bristol.....	Oct. 21, 1891
Leonard S. Gray.....	First Lieut...	Bristol.....	Oct. 21, 1891
Alonzo D. Emery	Second Lieut	Bristol.....	Oct. 21, 1891

COMPANY G.

Eugene S. Downs.....	Captain.....	Lebanon.....	Oct. 10, 1888
George A. Freeto.....	First Lieut...	Lebanon.....	Jan. 23, 1889
Benjamin M. Reynolds.....	Second Lieut	Lebanon.....	Jan. 23, 1889

COMPANY H.

Amos S. Ripley.....	Captain.....	Franklin Falls	Mar. 25, 1891
Hollis K. Smith.....	First Lieut...	Franklin Falls	Mar. 25, 1891
Albion W. Rollins.....	Second Lieut	Franklin Falls	Mar. 25, 1891

CAVALRY.

COMPANY A.

Charles B. Davis	Captain.....	Peterborough..	Aug. 27, 1890
Charles H. Dutton ...	First Lieut...	Peterborough..	Aug. 27, 1890
Forrest G. Field.....	Second Lieut	Peterborough..	Aug. 27, 1890

ARTILLERY.

FIRST BATTERY.

Samuel S. Piper	Captain.....	Manchester...	May 1, 1876
Edward H. Currier	First Lieut...	Manchester...	April 6, 1882
Silas R. Wallace	First Lieut...	Manchester...	Mar. 27, 1891
John A. Barker	Second Lieut	Manchester...	Mar. 27, 1891

RESIGNATIONS AND DISCHARGES
OF
COMMISSIONED OFFICERS.
GOVERNOR'S STAFF.

NAME.	Rank and Organization.	Date of Commission	Date of Discharge.	Remarks.
Elbert Wheeler.....	Brig. Gen. and Insp. Gen....	June 20, 1889	Jan. 8, 1891	Term expired.
Charles O. Hurlbut.....	Brig. Gen. and Q. M. Gen....	June 20, 1889	Jan. 8, 1891	Term expired.
Sylvester Little.....	Brig. Gen. and Com. Gen....	June 20, 1889	Jan. 8, 1891	Term expired.
Paul Lang.....	Brig. Gen. and J. A. Gen....	June 20, 1889	Jan. 8, 1891	Term expired.
John H. Cutler.....	Brig. Gen. and Surg. Gen....	June 20, 1889	Jan. 8, 1891	Term expired.
Fred A. Palmer.....	Colonel and Aid-de-Camp	June 20, 1889	Jan. 8, 1891	Term expired.
Daniel F. Healy.....	Colonel and Aid-de-Camp	June 20, 1889	Jan. 8, 1891	Term expired.
Stephen S. Jewett.....	Colonel and Aid-de-Camp	June 20, 1889	Jan. 8, 1891	Term expired.
Edward M. Gilman.....	Colonel and Aid-de-Camp	June 20, 1889	Jan. 8, 1891	Term expired.
Fred W. Cheney.....	Brig. Gen. and Insp. Gen....	Jan. 28, 1891	Mar. 5, 1891	Resigned.

BRIGADE STAFF.

Harry B. Cilley.....	Major and I. R. P.....	May 20, 1889	Jan. 28, 1891	Resigned.
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FIRST REGIMENT.

NAME.	Rank and Organization.	Date of Commission.	Date of Discharge.	Remarks.
Patrick A. Devine	Major	Mar. 11, 1886	Jan. 17, 1891	Resigned.
J. Franklin Robinson...	Major and Surgeon.....	May 21, 1890	June 9, 1891	Resigned.
Peter W. Pattee.....	Captain Co. C..	Apr. 30, 1890	Apr. 21, 1891	Co. disbanded.
George E. Whitney.....	1st Lieut. Co. C	Dec. 21, 1886	Apr. 21, 1891	Co. disbanded.
Frank A. Whipple.....	2d Lieut. Co. C.	Dec. 21, 1886	Apr. 21, 1891	Co. disbanded.
Edson J. Cheever.....	Captain Co. C..	Apr. 4, 1891	June 15, 1891	Resigned.
Benjamin H. Chamberlin.....	1st Lieut. Co. C	Apr. 4, 1891	Sept. 16, 1891	Resigned.
Otis F. Campbell.....	1st Lieut. Co. F	Apr. 8, 1891	July 30, 1891	Resigned.
Chris. J. Ward.....	2d Lieut. Co. K	May 21, 1890	May 14, 1891	Resigned.
Miner G. Frye.....	Captain Co. F..	Dec. 15, 1887	Mar. 31, 1891	Promoted to Major.
Charles F. Sawyer.....	2d Lieut. Co. D	May 29, 1889	Apr. 16, 1891	Promoted to Capt. and Brig. Com.

SECOND REGIMENT.

Arthur D. Farley.....	1st Lieut. Co. C	Mar. 19, 1888	Nov. 21, 1890	Resigned.
George A. Scribner.....	Captain Co. D..	Feb. 26, 1890	Feb. 16, 1891	Co. disbanded.
Howard E. Grant.....	1st Lieut. Co. E	Mar. 25, 1891	Mar. 7, 1891	Resigned.
Fred Hurd.....	2d Lieut. Co. E	Mar. 25, 1890	June 2, 1891	Resigned.
Albert Garland.....	1st Lieut. Co. F	Jan. 10, 1888	Mar. 10, 1891	Resigned.
Fred C. Foster.....	1st Lieut. Co. G	July 24, 1890	Mar. 14, 1891	Resigned.
Homer A. White.....	Captain Co. K.	Mar. 24, 1890	Mar. 11, 1891	Resigned.
Willie F. Frucan.....	1st Lieut. Co. K	Jan. 3, 1890	Mar. 11, 1891	Resigned.
Reuben M. Gregg.....	2d Lieut. Co. K	Mar. 24, 1890	Mar. 11, 1891	Resigned.

THIRD REGIMENT.

NAME.	Rank and Organization.	Date of Commission	Date of Discharge.	Remarks.
Willard Reed.....	Captain Co. A..	May 15, 1889	Feb. 19, 1891	Resigned.
Harley B. Roby.....	1st Lieut. Co. C	Sept. 16, 1889	Dec. 26, 1890	Resigned.
Charles W. Coolidge	Captain Co. F..	Apr. 12, 1889	Oct. 9, 1891	Resigned.
George N. Cheever.....	Captain Co. H.	July 1, 1879	Mar. 11, 1891	Promoted to Major.

COMMISSIONS ISSUED.

GOVERNOR'S STAFF.

NAME.	Rank and Organization.	Date of Commission
Fred W. Cheney.....	Brig. Gen. and Insp. Gen. . .	Jan. 28, 1891
Albert N. Dow.....	Brig. Gen. and Insp. Gen. . .	Mar. 5, 1891
Charles W. Stevens.....	Brig. Gen. and Q. M. Gen. . .	Jan. 28, 1891
Oliver A. Gibbs.....	Brig. Gen. and Com. Gen. . .	Jan. 28, 1891
Charles H. Bartlett.....	Brig. Gen. and J. A. Gen. . . .	Jan. 28, 1891
Ferdinand A. Stillings.....	Brig. Gen. and Surg. Gen. . .	Jan. 28, 1891
Arthur E. Clarke.....	Colonel and Aid-de-Camp..	Jan. 28, 1891
George A. Sanders.....	Colonel and Aid-de-Camp..	Jan. 28, 1891
Frank W. Maynard.....	Colonel and Aid-de-Camp..	Jan. 28, 1891
Rufus N. Elwell.....	Colonel and Aid-de-Camp..	Jan. 28, 1891

BRIGADE STAFF.

Frank W. Rollins.....	Lieut. Col. and A. A. G.	Mar. 7, 1891
Arthur H. Chase.....	Major and Judge Advocate	Mar. 7, 1891
Charles F. Sawyer.....	Capt. and Com.....	Apr. 16, 1891
Jerry P. Wellman.....	Major and I. R. P.....	Feb. 17, 1891

FIRST REGIMENT.

Miner G. Frye.....	Major.....	Mar. 31, 1891
Cornelius F. Starr.....	Capt. and Asst. Surg.....	May 29, 1891
Daniel F. Shea.....	Captain Co. B.....	Mar. 11, 1891
Edson J. Cheever.....	Captain Co. C.....	Apr. 4, 1891
Louis Stevens.....	Captain Co. C.....	May 29, 1891
Benjamin H. Chamberlin.....	First Lieut. Co. C.....	Apr. 4, 1891
Wilber W. Dickey.....	First Lieut. Co. C.....	Oct. 8, 1891
Alfred F. Eaton.....	Second Lieut. Co. C.....	Apr. 4, 1891

FIRST REGIMENT. -- *Continued.*

NAME.	Rank and Organization.	Date of Commission
George B. Rodgers.....	Second Lieut. Co. C.....	June 6, 1891
Ned E. Styles.....	Second Lieut. Co. D.....	June 4, 1891
Leighton H. McIntire	Captain Co. F.....	Apr. 8, 1891
Otis F. Campbell.....	First Lieut. Co. F.....	Apr. 8, 1891
Charles F. Gillespie	Second Lieut. Co. F.....	Apr. 8, 1891
Treflé Raiche.....	First Lieut. Co. H.....	June 6, 1891
Medrique R. Maynard.....	Second Lieut. Co. H.....	June 6, 1891
Michael J. F. Ward.....	Second Lieut. Co. K.....	June 12, 1891

SECOND REGIMENT.

William H. Livingston.....	First Lieut. Co. C.....	Feb. 23, 1891
Charles A. Poff.....	Second Lieut. Co. C.....	Feb. 23, 1891
Freeman C. Anderson	Captain Co. D.....	Jan. 27, 1891
Everett B. Coffin	First Lieut. Co. D.....	Jan. 27, 1891
Benton Mills.....	Second Lieut. Co. D.....	Jan. 27, 1891
Fred E. Plummer.....	First Lieut. Co. E.....	June 9, 1891
James Geddis.....	Second Lieut. Co. E.....	June 9, 1891
Hosea L. Bickford.....	First Lieut. Co. F.....	Mar. 16, 1891
George F. Davis	Second Lieut. Co. F.....	Mar. 16, 1891
John J. Colony	First Lieut. Co. G.....	Mar. 27, 1891
Eugene M. Keyes.....	Second Lieut. Co. G.....	Mar. 27, 1891
Walter I. Blanchard.....	Captain Co. K.....	Mar. 18, 1891
Samuel S. Spalding.....	First Lieut. Co. K.....	Mar. 18, 1891
Charles W. Howard.....	Second Lieut. Co. K.....	Mar. 18, 1891

THIRD REGIMENT.

George N. Cheever.....	Major.....	Mar. 11, 1891
Baxter Gay	Captain Co. A.....	Feb. 25, 1891
Frank P. Messer.....	First Lieut. Co. A.....	Feb. 25, 1891
Edwin F. Hastings.....	Second Lieut. Co. A.....	Feb. 25, 1891

THIRD REGIMENT. — *Continued.*

NAME.	Rank and Organization.	Date of Commission
Thomas P. Davis.....	First Lieut. Co. C.....	Feb. 26, 1891
Alfred L. Trenoweth.....	Second Lieut. Co. C.....	Feb. 26, 1891
Delta H. Merrill.....	First Lieut. Co. D.....	Nov. 17, 1890
Edwin B. Drake.....	Second Lieut. Co. D.....	Nov. 17, 1890
Harry B. Brown.....	Captain Co. E.....	Apr. 14, 1891
George D. Waldron.....	First Lieut. Co. E.....	Apr. 14, 1891
Harry P. Hammond.....	Second Lieut. Co. E.....	Apr. 14, 1891
Orrin B. Ray.....	Captain Co. F.....	Oct. 21, 1891
Leonard S. Gray.....	First Lieut. Co. F.....	Oct. 21, 1891
Alonzo D. Emery.....	Second Lieut. Co. F.....	Oct. 21, 1891
Amos S. Ripley.....	Captain Co. H.....	Mar. 25, 1891
Hollis K. Smith.....	First Lieut. Co. H.....	Mar. 25, 1891
Albion W. Rollins.....	Second Lieut. Co. H.....	Mar. 25, 1891

FIRST BATTERY.

Silas R. Wallace.....	First Lieut.....	Mar. 27, 1891
John A. Barker.....	Second Lieut.....	Mar. 27, 1891

ENLISTED MEN DROPPED FROM THE ROLLS AS
DESERTERS.

FIRST REGIMENT.

Napoleon Chamberland.....Co. H

NEW HAMPSHIRE AGRICULTURE.

TWENTIETH

ANNUAL REPORT

OF THE

BOARD OF AGRICULTURE

FROM

DEC. 1, 1890, TO NOV. 1, 1891.

By N. J. BACHELDER, SECRETARY.

CONCORD:

IRA C. EVANS, PUBLIC PRINTER.

1892.

BOARD OF AGRICULTURE.

ORGANIZED AUGUST 23, 1870.

MEMBERS.

MOSES HUMPHREY, <i>President</i>	.	.	.	Concord.
GEORGE S. PHILBRICK, <i>Vice-President</i>	.	.	.	Tilton.
CHARLES McDANIEL	.	.	.	Springfield.
JASON S. PERRY	.	.	.	Rindge.
LUCIEN THOMPSON	.	.	.	Durham.
JOHN D. LYMAN	.	.	.	Exeter.
ALONZO TOWLE	.	.	.	Freedom.
GEORGE A. WASON	.	.	.	New Boston.
FREEMAN P. COVELL	.	.	.	Colebrook.
GEORGE W. MANN	.	.	.	Benton.

NAHUM J. BACHELDER, *Secretary*.

GENERAL REPORT.

OFFICE BOARD OF AGRICULTURE,
CONCORD, N. H., November 1, 1891.

To His Excellency the Governor:

The twentieth annual report of the State Board of Agriculture from December 1, 1890, to November 1, 1891, is herewith submitted.

According to the report of the State Board of Equalization for 1891 there are in the State 71,276 horses, 19,401 oxen, 112,706 cows, 46,827 other cattle, and 119,999 sheep. Compared with the report for the previous year it shows a gain of 3,328 horses and 1,371 cows. The oxen have decreased 3,945, other cattle 8,101 and sheep 10,365. The decrease in the number of oxen, young cattle, and sheep is explained by the fact that stock raising and sheep husbandry have been largely superseded by fruit growing and the raising of garden products to supply the increased local demand of manufacturing places and the growing summer boarding industry. The year has been one of more than usual prosperity for the farmer, as good yields of nearly all crops have been attended by higher prices and more active demands. This has created a feeling of encouragement among those engaged in agriculture in so marked degree as to be plainly perceptible.

No serious outbreak of any contagious or infectious disease has occurred among the flocks and herds of the State during the year. An occasional case of cholera among swine and glanders among horses has been reported. The most common and dangerous disease now existing among the animals of the State is tuberculosis. While this is no new disease

its increase in recent years has been so marked and the danger therefrom to public health and life so well established that the legislature of the present year enacted a law for its suppression. This act came into effect April 15, and the work has been vigorously prosecuted since that time. It is now too early to make a detailed report of the progress made by the commission having the matter in charge, but there is every reason to expect that the result contemplated in the passage of the law will be attained and a full report will be made in our next volume.

The institute work has been attended by the usual encouraging and satisfactory results and will be found reported on pages 9 to 200 of this volume. The yearly increasing interest manifested by the farmers of the State in the institutes is noticeable and the most efficient service at the command of the Board has been provided. The efforts so successfully inaugurated in 1889 for securing the reoccupancy of abandoned farms and advertising summer resorts of the State have been continued and a report will be found on pages 201 to 236. Over 17,000 pamphlets have been distributed and there is every indication of beneficial results from the practical methods employed. In no direction could money be appropriated by the State and produce better results for the rural sections than in extending the work in this department.

The inspection of commercial fertilizers has been made in accordance with the practice of previous years. The oleo-margarine law has been strictly enforced and the producers and consumers of honest butter thereby protected from the fraudulent imitations.

Encouragement has been given in various ways to the agricultural organizations of the State, all of which have been attended by the usual degree of success. The Grange, with increased membership, has continued its excellent record for stimulating more intelligent and successful farming and is regarded with favor by all progressive citizens.

The Granite State Dairymen's Association has been active in promoting the interests of dairying, which has become a leading farm industry in the State.

The Agricultural College and Experiment Station have had a successful year and are making preparation for still more effective service in the new location. The Grange State Fair excelled all former exhibitions in attendance; also in variety and excellence of exhibits. The New Hampshire Horse Breeders' Association, which held the first meeting during the year, will stimulate more interest in this important and profitable farm industry. Reports of these organizations will be found in this volume.

The various agricultural fairs by county, district, and town associations have been more than usually successful. The creamery associations now numbering more than fifty in the State have been the means of increasing the profits of the farm in many sections. The Board has given much attention to securing reasonable and just legislation for the agricultural interests and early became interested in the acceptance by the State of the Thompson will. The action taken will be found reported in this volume, and, with other influences, secured the establishment at Durham of one of the most liberally endowed agricultural colleges in the country.

Briefly reviewing, the work of the Board for the year may be summarized as follows:

Institute work in the several counties of the State.

Advertising summer resorts and securing the reoccupancy of abandoned farms.

Suppression of contagious and infectious diseases among animals.

Encouragement in forming farmers' organizations.

Inspection of commercial fertilizers.

Enforcement of the oleomargarine law.

Securing just legislation in the interest of agriculture.

N. J. BACHELDER,

Secretary State Board of Agriculture.

INSTITUTES.

INSTITUTES.

COÖS COUNTY.

GROVETON.

The first institute of the winter was held at Groveton, December 8, the Board being represented by Vice-President G. S. Philbrick of Tilton, Dr. Alonzo Towle of Freedom, member from Carroll county, and Secretary Bachelder. J. L. Gerrish of Webster, Secretary of the Granite State Dairymen's Association, was also in attendance and assisted in the exercises. On account of repairs being made at the town house the institute was held in the church building of the Methodist society. It was called to order by Vice-President Philbrick who discussed the object and importance of farmers' institutes and introduced Secretary Gerrish who gave a talk on the general principles of stock breeding. The address was accompanied by the use of the blackboard, showing with chalk the forms of different breeds of cows and other farm animals. The secretary of the Board followed, having feeding tables hung upon the stage and using the blackboard also for figuring different rations for both milk and beef stock. The afternoon subjects were treated in rather an informal manner and the session brought to a close at an earlier hour than usual.

At the evening session Secretary Bachelder presided and Mr. Philbrick talked for an hour on "Gather up the Fragments." It will be impossible to give an idea of the many good points made. Among other things the speaker said: "There then is no occupation where there is such liability to waste as

in farming, many who keep cows do not know which are making the best returns for feed or whether they are feeding more of some things and less of others than are needed. Who can tell whether it is wasteful to raise calves when the milk can find a good market otherwise or how much the skim milk is really worth? I verily believe my best work as a farmer has been done in later years with a stub of pencil carried in my vest pocket.

“We ought conscientiously to put the best of ourselves into our work, whatever it is. He who starts in a given line of farm work and doesn’t study and figure to the bottom of it, does not deserve success, nor should he complain if there is no money in it. Slanders have been thrown at the farmer by those who say that we do not work enough — the fact is, gentlemen, we don’t think enough! A young farmer should measure himself by his enterprise and intelligence, and remember the agricultural application of the scripture truth, that ‘where our treasure is, there our heart is also!’ If your boy has any taste for farming develop and encourage it, that his energies may not be among the ‘fragments wasted.’”

The speaker then took up the subject of feeding where it was left in the afternoon, and its discussion, and questions following, occupied the first half of the meeting.

The next subject was “Horse Raising for Profit,” by Dr. Alonzo Towle. He commenced by giving prices from his father’s journal kept sixty years ago, showing that most farm products were as high then as now, with the exception of horses. The price of labor was so much higher now that he did not believe his father had raised a boy smart enough to pay his bills raising the same crops as the father did, although the father was able to pay for his farm and lay by quite a competency.

The price received for horses is now remunerative, if the right class is raised. He denounced raising the heavier class sent from Canada, which supplies us with three million dollars worth annually.

He recommended the raising of French coach horses by the average farmer, or, if the blood is not yet accessible, the nearest

to it possible. Not only patronize the horse that suits you as an individual, but be sure and learn if he can transmit his good qualities. The breeding of trotters is another thing altogether, but is for a class that can take better care, train and develop them.

After numerous questions on the subject and a rambling discussion the institute was brought to a close.

COLUMBIA.

The institute on the following day was held at East Columbia, the representatives of the Board being re-enforced by the presence of Mr. F. P. Covell of Colebrook, member for Coös county, who presided. The speakers and subjects were the same as at Groveton on the previous day. Numerous questions were asked by the audience and a good degree of interest was manifested. Between the afternoon and evening sessions, the representatives of the Board were handsomely entertained at the house of Mr. E. G. Rogers, one of the best farmers in the vicinity.

CARROLL COUNTY.

SANDWICH.

Vice-President Philbrick, Dr. Towle, Secretary Bachelder, and J. L. Gerrish held an institute at Centre Sandwich, December 11, which was well attended and a deep interest manifested in the subjects presented. Dr. Towle, the county member, presided and the subject of improved stock was quite fully discussed by Mr. Gerrish. This was followed by a general discussion of the subject and many good points were brought out. The secretary followed upon the subject of feed for the dairy, use being made of the feeding charts and black-board. Mr. Philbrick made a brief talk upon the principles of feeding, after which, adjournment was made until evening.

The evening session was occupied with an address by Dr. Towle upon the summer boarding industry and by Mr. Philbrick on creameries. Each occupied about an hour and were given the closest attention by an appreciative audience.

MADISON.

An eighteen mile ride on the following morning brought the representatives of the Board to Madison where considerable interest was manifested, although one of the coldest days of the season. The speakers and subjects were similar to those on the previous day at Sandwich. S. A. McDaniel and William Furbush, of Freedom, were present and made interesting remarks.

SULLIVAN COUNTY.

GOSHEN.

The first session of the Sullivan county institute was held at the town hall, Goshen, on the afternoon of January 26. The speakers and subjects were as follows: Hon. Moses Humphrey, "Stock Breeding;" Charles McDaniel, "Sheep Husbandry;" Hon. J. B. Walker, "How we miss it in Farming." The audience was apparently interested and a profitable time was the result.

NEWPORT.

On the evening of January 26, a session was held in G. A. R. hall, Newport, at which the speakers were Secretary Bachelder on "Dairying" and Alonzo Towle on "Horse Breeding." Hon. Moses Humphrey presided and the hall was filled to its utmost capacity. The numerous questions asked the speakers evinced the interest taken in the subjects discussed.

WASHINGTON.

President Humphrey, with Messrs. McDaniel and Walker, held an afternoon and evening session at the town hall, Washington, on the following day. A fairly good attendance greeted the speakers on their arrival and considerable interest was manifested in the exercises. The subjects and speakers were the same as at Goshen on the previous day.

MERRIMACK COUNTY.

CONCORD.

An institute covering two days, was held by the state Board of Agriculture, at Concord, January 11 and 12, 1891, the sessions being held at Chase's hall.

At 11 A. M. the meeting was opened by the President, who introduced His Honor Mayor Clapp of Concord. Mayor Clapp spoke as follows:

MAYOR CLAPP OF CONCORD.

Mr. President and Gentlemen of the New Hampshire Board of Agriculture:

It gives me great pleasure to be here this morning and tender to you, in behalf of our city, our hearty welcome.

This subject that is before you is something that is entirely new to me. I have no practical knowledge of farming, but I have come here to listen to those speakers who have had experience in that line. As I have no knowledge of what has been said on this subject before, or how it should be treated, it would be very arduous for you to have me attempt to make any speech here at this time. But I am well aware, from what I have read, that this society has done a great deal of good to the people of New Hampshire. And I have the pleasure of knowing that there is one gentleman among us today, who has

taken a great deal of interest in this society, a man who has given it a great deal of thought and time, a man with whom you all are well acquainted, I think, and to him, your president, the Honorable Moses Humphrey, I have now the pleasure of yielding the floor.

A response to the Mayor's welcome was made by President Humphrey as follows :

PRESIDENT HUMPHREY'S ADDRESS.

Mr. Mayor : In behalf of the Board of Agriculture and friends of the same, we accept your kind greetings as approval of the work which we are all engaged in, especially as it comes from the distinguished representative of the city whose prosperity and growth depends quite largely on its agriculture and the agriculture of the surrounding towns. We hope before closing this series of meetings another advance step in the cause of agriculture will be taken, for one of the objects of these meetings is, by addresses and discussions, to move forward the people so that they will examine into these matters and see where they stand, take an observation of the past and present time, and see if the improvements now going on are worthy of their attention.

It is twenty years since the first meeting of the Board, which was held in this city, and at that time Mayor Jones gave the Board a very cordial welcome as the pioneers in the great work that lay before them. Of the original ten members who met at that time eight have passed on to the better world. Their places have been filled with other distinguished citizens by appointments of the Governors. It has been very gratifying to me to be associated with the gentlemen of the Board who were so willing to do the valuable work gratuitously for the best of all occupations. Our relations together have been very harmonious, and, although of different political and religious views, we never have let politics enter our work but have worked together as one family.

In arranging these meetings it was thought best by the

members of the Board that we should have some of the best agricultural talent in New England to give us valuable information by their several addresses and discussions, thus giving new ideas and thoughts so that we might move along and keep pace with the progress of the day, for it is self-evident that agriculture of all the branches of industries wants to avail itself of all the improvements in science, arts, and machinery, as well as the best thoughts of the day. In looking back to the days of my boyhood and making the contrast with today it is wonderful and astonishing to witness the great changes in all branches of industries, especially in agriculture, and the customs and fashions at that time. There was no machinery nor improved tools to help the farmer nor household implements to assist his wife in the work of the family. It was all done by the strong arm of industry and endurance.

Then was the wooden mould board plow ironed by the village blacksmith, in fact, all the tools were made by the same party for the work on the farm, such as the scythe, hoes, and forks of different patterns. In the house was the old fire place with crane and hooks to hang the pots and kettles on, with the large andirons, back log, and forestick with wood piled up on them for the fire to do the cooking with, for there were no cook stoves. Baking was done in the brick oven except what might be done in the dutch oven. Occasionally johnny-cakes were baked on wooden plates before the fire. The spare-rib was roasted before the fire, being held by a string attached to the mantle, turned and basted as was required to cook it nicely. There were no friction matches then. If they lost the fire they went to the neighbors to borrow some. To kindle their fire in some families they had the flint and steel. Lights were all tallow candles. The houses and barns were of the most uncomfortable kind. The clothing for the family was all homespun. The cloth was made by the family from the products of the farm and finished by the clothier of the village. The garments were made up by the all-accommodating tailoress and dress-maker, who went from house to house in town to do the work and generally were the encyclopedia of the town,

knowing all the gossips of the day and always full of news. The horses and cattle were of the most ancient breed, for there was no improved stock then. At that time it was all barter; if any trade was to be made it was, "How can we exchange our stuff?" If any work was to be done, "What can I pay you in?" The products of the farm were all drawn to market by the farmers' teams. In the winter there could be seen sometimes a large number of ox teams on the through traveled roads. The farmers generally traveled in companies of from three to ten, carrying their own grain for their horses and their own cooked food for themselves, buying generally one meal per day as they were strict economists. Sometimes they would indulge in a mug of flip in the evening at the tavern. The public travel was all done by stage coach. In most of the back towns they had the mail but once a week, distributed by post riders or in a one horse gig. There were no railroads to develop the country. Steam navigation was scarcely known only on the Hudson river by a few small experiment boats with the high pressure engines made in a very primitive state. There were no steamships to cross the ocean. Now when we look around at this time have we kept step with the progress of the times. We find the cook stove in the house; the dairy implements of modern improvements a great advance over the past to assist the patient and toiling housewife; the spinning wheel and loom are gone. In the field we find the sulky plow and mowing machine together with the horse rake, tedder, corn planter, and horse hoes, all great improvements over the past. The best blooded horses and cattle for profit and pleasure. Railroads and steamboats for transportation of our crops. With all these advantages have the farmers availed themselves of the surrounding advantages? Do they understand the great problems of to-day so that they can easily solve them? In the first place our fathers had more or less of the virgin soil to cultivate which would produce crops easily. It did not require brain labor as it does today. Now we want to understand our soils, how they should be treated, whether they are adapted to this crop or that, and all the farmers want

to avail themselves of the best agricultural knowledge of today from papers and books and also from meetings for the discussion of all agricultural subjects when presented by the speakers in their special line of thought. I hope when this meeting closes we can all say it has been a profitable meeting to us all.

I now have the pleasure, ladies and gentlemen, of introducing to you Mr. McDaniel, Master of the State Grange. He is also, we are happy to own, a member of our Board. He will speak to you upon the topic of "Farmers' Organizations."

FARMERS' ORGANIZATIONS.

BY CHARLES MC DANIEL.

Mr. President, Ladies and Gentlemen :

Farmers' organizations are far more numerous at the present time than in the past.

We find that in Italy, in the beginning of the last century, as early as 1723 an agricultural society was formed. A society for improvement in the knowledge of agriculture was instituted in Scotland about the same time. This was of short duration, but the necessity of organization was felt, and another was formed in 1755,—this shared the same fate as its predecessor. In 1783, a number of gentlemen met and organized in Edinburgh for permanence the Highland Society. It held its first annual meeting in 1784 and was incorporated in 1787. Although designed for the Highlands, its power and influence spread all over Scotland, and it was under a royal charter in 1834 called the Highland and Agricultural Society of Scotland. Its earliest efforts were aided by government appropriation. However, its charter was paid for by private subscription. Its membership was then only one hundred and fifty, while now they have over five-thousand. Our experience in the United States is similar.

The most important objects of this organization were to exhibit specimens of stock, tools, and dairy produce in the various towns in that country.

1. Agricultural meetings and general shows of stock, imple-

ments, and dairy produce held in the principal towns of Scotland.

2. Encouraging a system of district shows, for the improvement of breeds of stock most suitable to the different parts of the country.

3. The encouragement and promotion of a proper system of agricultural and forestry education, by means of powers conferred by a supplementary royal charter in 1856, authorizing "the council of the Highland and Agricultural Society on education" to prescribe a curriculum of study, and to grant diplomas and certificates to students of agriculture who shall pass the requisite examination.

4. The advancement of the veterinary art, by conferring the society's certificate on students who have passed through a regulated curriculum in the Edinburgh veterinary college, and who are found by a rigid examination qualified to practice.

5. The appointment of two chemists for the purpose of analyzing soils, manures, etc., to members, and for promoting the application of science to agriculture.

6. The establishment of an agricultural museum, illustrative of the vegetable products of the country; but this collection has been handed over to the Edinburgh museum of science and art.

7. The annual publication of reports and prize essays on all branches of agriculture and arboriculture, as well as the proceedings of the laboratory.

Other agricultural societies all over Europe and foreign countries have not been a benefit in those distant lands, but have aided us here in America, where our land, as a rule, is owned by those who form the same agricultural organizations in great numbers. Every state has its state, county, and town or local societies.

The present Board of Agriculture was incorporated by an act of the legislature and approved July 2, 1870, consisting of ten members, only one, our honored President Humphrey, is now a member of the Board. The work of this organization has awakened a general interest in the various branches of

agriculture by holding its annual meetings in different parts of the State, and in each county yearly, by the presentation of papers, essays, and discussions on our great variety of agricultural subjects.

This Board having the welfare of the agricultural prosperity at heart, has given its time and ability to the work, and has aided very materially in promoting a higher and better agriculture.

Every county in the state has had its own organization, called Fair Associations, while several towns have had a Farmers Club, nearly all of which have apparently outlived their day of usefulness and passed into history.

In 1865 a pioneer farmer, O. H. Kelley in Minnesota, in consequence of drouth and failure of crops, was compelled to look for outside employment. He found a place in the Agricultural department in Washington. He was selected by President Johnson to go South and see what could be done to place that wrecked and almost ruined country once more upon its feet.

In January, 1866 he started and spent several months in the work, and while there he became impressed with the advantages for the farmers of his country, of having an organization, above and beyond sectional and party lines, something that would unite them by the "strong and faithful tie of agriculture."

Returning to Washington, he laid his plans before William Saunders, then, as he now is, at the head of the governmental grounds, a man who is known and honored by the farmers, florists, fruit growers, and gardeners of this country.

These two gentlemen, with others in Washington, the sons of farmers, became interested and a new organization was born, and christened by the name of *Grange* or Patrons of Husbandry. From that time, 25 years ago, this organization has grown and waxed strong; although it has had reverses, it has continued to live and thrive, and is now, at the end of a quarter of a century, stronger than ever before.

To perfect this organization it was found necessary, like

political parties to have a platform, or like the church to have a creed, or like our fore-fathers, a Declaration of Independence. So the farmers have their Grange platform, their creed, their Declaration of Purposes, which is the foundation, the starting point, of this great organization.

It is not the work of an individual but the official language of the order itself, which embraces, town, county, state, and nation. Therefore, it is a national organization. The general objects are: "United by the strong and faithful tie of agriculture, mutually resolve to labor for the good of our 'Order,' our country, and mankind."

MOTTO.

"In essentials, unity; in non-essentials, liberty; in all things, charity."

SPECIFIC OBJECTS.

We shall endeavor to advance our cause by laboring to accomplish the following objects:

To develop a better and higher manhood and womanhood among ourselves. To enhance the comforts and attractions of our homes, and strengthen our attachments to our pursuits. To foster mutual understanding and coöperation. To maintain inviolate our laws, and to emulate each other in labor, to hasten the good time coming. To reduce our expenses, both individual and corporate. To buy less and produce more, in order to make our farms self-sustaining. To diversify our crops, and crop no more than we can cultivate. To condense the weight of our exports, selling less in the bushel and more on hoof and in fleece; less in lint and more in warp and wool. To systematize our work, and calculate intelligently on probabilities. To discountenance the credit system, the mortgage system, the fashion system, and every other system tending to prodigality and bankruptcy.

We propose meeting together, talking together, working together, buying together, selling together, and, in general, acting together for our mutual protection and advancement, as

occasion may require. We shall avoid litigation as much as possible by arbitration in the Grange. We shall constantly strive to secure entire harmony, good-will, vital brotherhood, among ourselves, and to make our Order perpetual. We shall earnestly endeavor to suppress personal, local, sectional, and national prejudices, all unhealthy rivalry, all selfish ambition. Faithful adherence to these principles will insure our mental, moral, social, and material advancement.

BUSINESS RELATIONS.

For our business interests, we desire to bring producers and consumers, farmers and manufacturers, into the most direct and friendly relations possible. Hence we must dispense with a surplus of middle-men, not that we are unfriendly to them, but we do not need them. Their surplus and their exactions diminish our profits.

We wage no aggressive warfare against any other interests whatever. On the contrary, all our acts and all our efforts, so far as business is concerned, are not only for the benefit of the producer and consumer, but also for all other interests that tend to bring these two parties into speedy and economical contact. Hence we hold that transportation companies of every kind are necessary to our success, that their interests are intimately connected with our interests, and harmonious action is mutually advantageous, keeping in view the first sentence in our Declaration of Principles of action, that "individual happiness depends upon general prosperity."

We shall therefore advocate for every state the increase in every practicable way of all facilities for transporting cheaply to the sea-board, or between home producers and consumers, all the productions of our country. We adopt it as our fixed purpose "to open out the channels in nature's great arteries, that the life-blood of commerce may flow freely."

We are not enemies of railroads, navigable and irrigating canals, or of any corporation that will advance our industrial interests, or of any laboring classes.

In our noble Order there is no communism, no agrarianism.

We are opposed to such spirit and management of any corporation or enterprise as tends to oppress the people and rob them of their just profits. We are not enemies to capital, but we oppose the tyranny of monopolies. We long to see the antagonism between capital and labor removed by common consent, and by an enlightened statesmanship worthy of the nineteenth century. We are opposed to excessive salaries, high rates of interest, and exorbitant per-cent profits in trade. They greatly increase our burdens, and do not bear a proper proportion to the profits of producers. We desire only self-protection, and the protection of every true interest of our land by legitimate transactions, legitimate trade, and legitimate profits.

EDUCATION.

We shall advance the cause of education among ourselves, and for our children, by all just means within our power. We especially advocate for our agricultural and industrial colleges, that practical agriculture, domestic science, and all the arts which adorn the home, be taught in their courses of study.

THE GRANGE NOT PARTISAN.

We emphatically and sincerely assert the oft-repeated truth taught in our organic law, that the Grange—National, State, or Subordinate—is not a political or party organization. No Grange, if true to its obligations, can discuss partisan political or sectarian religious questions, nor call political conventions, nor nominate candidates, nor even discuss their merits in its meetings.

Yet the principles we teach underlie all true politics, all true statesmanship, and, if properly carried out, will tend to purify the whole political atmosphere of our country, for we seek the greatest good to the greatest number.

We must always bear in mind that no one, by becoming a Patron of Husbandry, gives up that inalienable right and duty, which belongs to every American citizen, to take a proper interest in the politics of his country.

On the contrary, it is right for every member to do all in his power legitimately to influence for good the action of any political party to which he belongs. It is his duty to do all he can in his own party to put down bribery, corruption, and trickery; to see that none but competent, faithful, and honest men, who will unflinchingly stand by our industrial interests, are nominated for all positions of trust; and to have carried out the principle, which should always characterize every Patron, that

THE OFFICE SHOULD SEEK THE MAN, AND NOT THE MAN
THE OFFICE.

We acknowledge the broad principle, that difference of opinion is no crime, and hold that "progress toward truth is made by difference of opinion," while the "fault lies in bitterness of controversy."

We desire a proper equality, equity, and fairness; protection for the weak; restraint upon the strong; in short, justly distributed burdens, and justly distributed power. These are American ideas, the very essence of American independence, and to advocate the contrary is unworthy of the sons and daughters of an American republic.

We cherish the belief that sectionalism is, and of right should be, dead and buried with the past. Our work is for the present and the future. In our agricultural brotherhood and its purposes, we shall recognize no North, no South, no East, no West.

It is reserved by every Patron, as the right of a freeman, to affiliate with any party that will best carry out his principles.

OUTSIDE COÖPERATION.

Ours being particularly a farmers' institution, we cannot admit all to our ranks.

Many are excluded by the nature of our organization, not because they are professional men, or artisans, or laborers, but because they have not a sufficiently direct interest in tilling the soil, or may have some interest in conflict with our pur-

poses. But we appeal to all good citizens for their cordial co-operation to assist in our efforts toward reform, that we may eventually remove from our midst the last vestige of tyranny and corruption.

We hail the general desire for fraternal harmony, equitable compromises, and earnest coöperation as an omen of our future success.

CONCLUSION.

It shall be the abiding principle with us to relieve any of our oppressed and suffering brotherhood by any means at our command.

Last, but not least, we proclaim it among our purposes to inculcate a proper appreciation of the abilities and sphere of woman, as is indicated by admitting her to membership and position in our Order.

Imploring the continued assistance of our Divine Master to guide us in our work, we here pledge ourselves to faithful and harmonious labor for all future time, to return by our united efforts to the wisdom, justice, fraternity, and political purity of our forefathers.

These are some of the principal "declared purposes" of the aims and objects of this farmers' organization.

Now let us look at some of the results. It will be seen that education is the chief corner-stone of this organization. It shows that the farmer has mind as well as muscle, brains as well as land, and it pays to cultivate both for "knowledge is power." It teaches us not only how to be better farmers, how to get better returns for our work, how to raise a crop, but how to sell it at the best advantage. Not only how to get money but how to get the most out of it.

Farmers have been learning that while they have strength and influence as individuals, "strength united is stronger;" that while individual efforts walk slowly, united efforts travel on flying trains or ocean steamers, that organizations good or bad move the world. The farmer and his interests will be advanced and respected just in proportion as he improves his education in all things that pertain to him in his several relations as a man, as a farmer, and as a citizen.

The farmer by this organization has been studying the law of supply and demand, trusts, corners, dealings in future, and the transportation question.

He has even taught some of the lessons he has himself learned, to the great corporations who control the commerce of the country, and the end in this direction is not yet.

We have learned about cheap money and dear money, or scarce money and plenty money, coöperative buying and selling, taxation equal and unequal, where more than a just proportion is levied and paid, whether direct or indirect. We have by examination learned of the profits in insurance by life and fire insurance companies, and here let us show the practical workings not only here in New Hampshire but in other states. Our Grange Mutual Fire Insurance company now in operation has property of over \$1,500,000 insured among its members since July 20, 1888; with all losses paid and expenses of the officers of the company and incidentals, we have a surplus of over \$5,000 on interest out of less than one half the premium charged by our stock companies for three years time. This insurance is as safe and reliable as can be found anywhere. New York has over sixty coöperative or Mutual Insurance companies, having insured over \$60,000,000 Patrons' property at an average cost of \$1.84 per thousand dollars for three years. Similar companies are in successful operation in several other states with equally as good showing.

One of the late insurance commissioners of Massachusetts says: "The country suffers itself to be taxed annually on immense sums for the support of a numerous army of insurance brokers and super-serviceable agents who produce nothing and are no valuable use whatever. I believe that the people of Massachusetts pay each year for fire insurance a sum beyond its fair cost under an economical administration of the business upon correct methods, equal to annual state tax." Doubtless what is true in regard to Massachusetts is equally true in regard to New Hampshire.

Relief associations and life insurance are also prominent

features of this farmers' organization. To say nothing about the financial arrangement of coöperative stores, and buying of phosphates, grass seeds, flour, corn, and other grain used in the east, produced cheaply in the far west would be to omit another valuable work of the organization.

The farmers have been learning lessons in politics, the science of government. They have been learning that we are all under the same laws whether democratic or republican; that what will benefit, or injure one farmer will benefit or injure another. Many politicians in both parties have been learning this lesson of late from the farmers.

By this Grange work we have made our homes better and brighter, and our farms better. We have investigated about soils and fertilizers and improved methods, about intensive and extensive farming.

THE PRESIDENT: I wish to inquire about the insurance. Does that branch take anybody from outside the Grange?

MR. McDANIEL: No, sir. One has to be a member in the Grange in good and regular standing to get the benefit of the insurance.

MR. GERRISH: Mr. President, we have one present with us who will speak to us this afternoon, but I would like to hear him say a few words at this time—Dr. Twitchell, a member of the state Grange of Maine.

DR. TWITCHELL: Mr. President, I am going to speak but a moment. I want to indorse what has been said by your worthy state master, Brother McDaniel, as to the power of organization. It is a watch-word of our era. Organization is everywhere—in all branches of trade, in all fields of labor, social and religious, moral and political, everything is tending to organization; and it seems to me the lesson for us interested in agriculture to learn, is the value of perfect and complete organizations, which may be made of especial benefit to the cause we represent. Here is one organization which has been very clearly outlined by our worthy brother, and I wish I might emphasize what he has said.

He has presented the financial advantages of our organization very clearly, but I would like to say a word about the social feature of the Grange. Last summer I had the pleasure of spending a week in New Hampshire among the people. I believe, in every place I visited, some sister came to me and told me what the Grange had done for her; how it had broken in upon the isolation of the farm life. "Why," she said, "It has been a new world to me. I am now going around among my neighbors, and have a pleasant time meeting with others." I remember of being at an asylum, and I was asked by the superintendent, "Can you tell me why it is that so large a per cent of the inmates in our asylum come from the farm homes?" There was only one cause that I could give. It was the fact that farmers' wives lived by themselves, lived there thinking upon their work and the maintenance of the house, and they finally broke down under the load which was partly real and partly imaginary, perhaps. A few years later, walking through the same halls with him, I asked him the question as to the per cent of inmates from the farmers' homes then. He stated that it had grown less, and he said, "Do you know, I think the credit of it must be given to the Grange, because, as I talk with the ladies from the farm homes, I find that they tell me what good times they have had in the Grange, and how social folks have been with them."

Over the line, in my own state, we are working upon this problem of organization. We are trying to complete the organization of the Grange, so that we may direct the efforts of all the membership upon certain lines of work which may be necessary for the benefit of the cause of agriculture. Down at our legislature, they do not dare to express an opinion, until they find out whether a man is a granger or not. A man said, "Damn the grangers! there are so many of them here that we do not know whether to pass a bill or not." And I am given to understand that that is about the case up here too. We are now asking our legislature that the appropriation for the board of agriculture be doubled. The bill passed the house without a dissenting voice, none daring to rise and speak against it.

It has passed the second reading in the senate and is now being engrossed. We asked that the salary of the secretary be increased so that he might give his entire time to his work as secretary, and that a clerk be provided for him. The power of organization is behind that request, and the representatives know that the Patrons of Husbandry are united upon it. We are also working on this great question of taxation, and next Tuesday we are going up in a body to present our views and arguments in favor of the equalization of these burdens.

There is no other way in which work for the benefit of agriculture can be done, I say to you, brothers and sisters — for I see evidences on the faces of some of you that you are Patrons. I also wish to say to you, that you must not be contented with the work that has already been accomplished in the past here in New Hampshire. There is work to be done by you still. I cannot express, at the present time, the power of organization for good. It touches us upon every hand, in our farm work when dealing with the little things that so often perplex us, as well as in the larger affairs of life. It may be used for the uplifting of everything that is good and truthful, and in doing that we are making organization what it was intended to be. By using this power in this way, we may make the farm life happier, and uproot some of the evils which we see to-day and which we all so much regret.

Adjournment was made until 2 o'clock P. M.

AFTERNOON SESSION.

The meeting was called to order at 2 P. M., by the president.

THE PRESIDENT: I have the pleasure of introducing to you Professor Whitcher of the Agricultural college, at Hanover, and director of the Experiment Station. I think he will give you something that is valuable.

WORK OF THE NEW HAMPSHIRE EXPERIMENT
STATION.

BY PROF. G. H. WHITCHER, HANOVER.

Mr. Chairman, Ladies and Gentlemen :

The subject that was given to me to present to you at this time was the "Work of the New Hampshire Experiment Station." As the chairman has indicated, I am, in a measure, more or less responsible for that work. Yet I do not want you to get the impression that I claim to do it all. I am willing to divide the honors, and, if there are any crosses, to divide those also. I know that there is a liberal discount placed upon people that blow their own horns, and, on that account, in speaking to you of experiment stations, I should much rather talk about the work done at the Massachusetts Experiment Station or at any other station than that of New Hampshire. Still, as I have said, that subject was assigned to me and I consented to take it, on the spur of the moment, perhaps. I feel the more willing to tell you what our work has been, because I think that all those interested in agriculture should know something about what we are doing.

About three years ago, at a meeting in this city, the question of the prosecution of the work of the experiment station was brought up and I spoke upon the subject. Then the field was clear. There was no experiment station in New Hampshire, and I could paint just as bright pictures as I pleased; I could cover the canvas all over with red, and probably did do so, as my hopes for the future were great. Perhaps we have not done so much as we expected to do at that time. I realize to-day, what I did not realize then, that these things take time. I had the impression that money would accomplish anything, and all that was necessary was to have a certain fund of money and the results would appear—that they would spring up like toad stools upon a warm day. But they do not grow in that way, especially in matters of so much importance as that of the experiment station certainly is to the agricultural community. There was a great deal of work

to be done to get ourselves in position to work. But I am not going to apologize for the work we have done, neither am I going to pat myself complacently on the back, and congratulate myself and fellow-workers with the great results that have been accomplished since the station was started. It is my province to give you simply a statement of that work.

You doubtless all know what the history of experiment stations in this country is. In the first place, fifty years ago, a demand began to be felt for some sort of definite information and instruction in regard to agriculture. Then came the agricultural colleges. Later it was seen that there were two kinds of work in the field of agriculture. One is the scientific field, embracing the knowledge and science of agriculture, and the other is the experimental one, which field is for the benefit of the practical farmer. It is in this latter field that we, at the experiment station, are working. We have two funds, one devoted entirely to the educational part of the work and the other to the experimental part of the work. It is for the use in New Hampshire of this last fund that I am in some measure responsible. The prime object, the principal idea that we have in mind in the use of this fund, is to do practical work, work that can be put to practical use by the farmers of New Hampshire. A great deal of study is spent to do everything so that it shall have a direct and practical bearing upon our farmers. There are certain effects of the work that cannot be measured in dollars and cents. As I said in the farmers' meeting at Manchester this winter, you cannot measure the value of the work of the experiment stations in this country in dollars and cents any more than you can measure the value of the schools and churches of this country in dollars and cents. You cannot tell to-day, what the financial advantages to the state of New Hampshire are, of any of the educational institutions of the state, the Agricultural college, Dartmouth college, or any of the institutions of that nature. We have had to-day illustrations given us in a very clear and vivid manner, of many of the advantages of the Grange, and yet you

cannot measure them by means of dollars and cents. This work is something in which the farmers of New Hampshire are doubly interested. As an illustration of the practical work that we are doing, we will take an industry which has had marked developements within the past few years—the dairying industry. We thought that was one of the most important interests for the farmers of New Hampshire, and that it should be one of the things that we should consider first; and I may state that the three years that have elapsed have shown us that no mistake has been made in that direction. We have been testing various breeds of animals. We may have been mistaken in selecting our breeds—the individuals. There will always be room for doubt on these points. In speaking on this subject, I am very well aware that it is impossible for any person, or set of persons, to carry on tests involving several breeds of cattle without drawing severe criticism. That was to be expected from the start. Breeders have a special interest in the breeds they are raising, but, so far as the station is concerned, it has no interest in one breed more than in any other.

To give you something of an idea of what extensive preparations we need to carry on this work, I wish to say something in regard to our equipment. Many of you have been at Hanover and have seen our work. I wish you had all been there, for I would rather talk to those who have been there, as they have some conception of the way in which we are doing these things.

We started out with an equipment representing about four thousand dollars worth of live stock to carry on our tests with. The work of the farm is of two kinds. There are two kinds of work which will be carried on by almost any experiment station: viz., those experiments which have to do with plant growths or the raising of crops, and, secondly, those experiments which have to do with the raising of live stock and the feeding of that live stock. All of our work may be reduced to these two branches—animal nutrition and plant nutrition. Of these two, the subject of plant growth must be considered

the first. We have prepared for the second part of this work with a liberal outfit of live stock. In selecting this live stock, of course, errors of judgment have been made, but about that I have nothing to say. We have also a good farm that is well equipped with the necessary tools and conveniences for carrying on the work. We have built the necessary buildings, including the experiment station, and we have made additions to the barns for the better accommodation of this stock, which has cost us in the vicinity of three thousand dollars. The total amount of money which we have expended in equipment has been some eleven or twelve thousand dollars.

But what have we done? Let me use a quotation which is perfectly legitimate in this connection, — “By their fruits shall ye know them.” All experiment stations must be judged by their fruits. I will say that there are two kinds of fruit that have been the result of this experiment station. In the first place, there is one fruit which exhibits itself in the form of bulletins which are sent out every year from the station. Then there is a certain other kind of effect, a perfectly legitimate sort of fruit, which results indirectly from the bulletins themselves and through the medium of various reports that we are constantly presenting to the various farmers of the state. During the last two years we have presented personally through the members of the station staff, to between ten and twelve thousand people the results of our work at such institutions as this and at other places. Not only that, but our work has had its effect outside of the state, for our reports have reached beyond the state lines, and we have been called at various times to go into other states and report on the results obtained.

The station bulletins are sent to about seven thousand farmers in the state. Or I presume that most of them are farmers, although I cannot know them personally. As a rule, they are those persons who have a direct interest in agriculture. Our list includes seven thousand names. We have sent out eleven bulletins, and we have material on hand at

the present time for about three bulletins more. The work for those bulletins is very nearly completed, and we hope to issue them in a short time.

There was a demand on the part of the law by which the Experiment Station was established, that a certain number of bulletins should be issued the first year, and we were obliged to comply with that demand regardless of the quality of their contents or the importance of the subject matter of those bulletins. But we were more fortunate in that respect than the experiment stations of many other states, because, as you are all very well aware who have taken an interest in the agriculture of the state, Professor Sanborn ten or twelve years ago commenced experimental work upon the college farm. I want to say right here, that I lift my hat to Professor Sanborn every day in the week. He is one of the best men in this country; and when he went from here to a larger field of action, New Hampshire met with a great loss. But that is a digression. I carried on, as far as our means would permit, the same line of work which he had started, and so we had a certain amount of material accumulated at the time the station was established. We had the material on hand which gave us our first three bulletins. I will say here that there are bulletins that we have given out from this station that I am proud of; but of the first three, I cannot say that I am proud. There was a strong necessity for our issuing those. The law demanded four the first year, and four they got; but as far as the quality of the four is concerned, I wish to be excused from saying anything on that point. I don't find any fault with No. 4, but, as far as Nos. 1, 2, and 3 are concerned, they should have been condensed into one. No. 1 treats of the subject of ensilage, 2 and 3 are a continuation of that subject. No. 4 is in regard to a subject that we consider of very great importance to the farmers of New Hampshire, of more importance than any other one subject—the subject of stock feeding. On that line of work we have put in a great deal of hard study and hard work at the Experiment Station. No. 4 gives in as precise a form as would have been feasible

the scientific principles that lie at the bottom of stock feeding. As to the importance of this line of work there is one point that I will simply allude to, and that is, the saving that may be made through care given to the subject. A saving of one cent per day on each cow in the State of New Hampshire would make a saving of about one hundred thousand dollars during the course of the winter. Yet there are data in that bulletin for the farmer, if he will apply them practically, that will save more than two cents a day on every cow in his stable, and give as good results as he is getting to-day and perhaps in many instances better. I am satisfied that the results given in this bulletin are substantially correct, and they accord with the feeding experiments that have been going on in Durham, England. I may say right here that ensilage—which is treated of in Bulletin No. 1—becomes an important factor in this feeding. I believe that one of the most important means of saving in feeding is the careful raising and cheap storing of our crops. It is not that the silo adds anything, that it is of advantage, but simply through the means that it furnishes us for cheap storage.

In Bulletin No. 5 we have another line of agricultural work which relates to the raising of plants, viz., the use of fertilizers. It is true, I think, that three-fourths of all the letters addressed to the station asking definite questions relate to either stock feeding or the use of fertilizers. Those are the subjects that appear to be uppermost in the minds of the farmers, and it is the last one of those subjects that we have tried to treat in Bulletins Nos. 5 and 6. No 5 is more especially a theoretical document, showing what the material is and where it is to be obtained for the feeding of plants. During the last twenty years, and I may say during the last fifteen years, there has been a very great advancement made in the sources of plant food. There are a great many waste products, which a few years ago were thrown away as absolutely worthless, that are being put to good purpose in this way. This may almost be called a day of utilization of waste products. As an illustration of this, let me call your attention to

the one subject of cotton-seed meal. The cotton-seed was simply worthless not a great many years ago, and now they extract the oil from it and manufacture that oil into hog's lard and into olive oil for use in putting up sardines, etc. And then from that cotton-seed we get the cotton-seed meal, and so on. There has been the same advance made in using other waste products, and the phosphates, nitrates, and potash have been given to us in the form of fertilizers. Our work in relation to fertilizers has been of a broad, practical character. We have not wasted our time and our efforts in testing different brands of fertilizers, because that would be simply useless. The difference is very much in people's eyes, if you will allow me to say so. We think it would be a waste of time at the Experiment Station, or any experiment station, for that matter, to spend it in testing these fertilizers. They all have practically the same composition, and are sold practically at the same price. We have tried to find out, if we could, what kind of fertilizer was best adapted to our soil and climate and to arrive at practical results. While we do not claim that the work done in this line can be of great scientific accuracy, it is of great practical importance in my mind. The results of our experiments I can give very briefly. While the average fertilizer sold and put upon the market, the commercial fertilizer that you buy, contains something like ten per cent of phosphoric acid, thirty-two per cent of nitrogen, and two per cent of potash, the fertilizers that gave the best results in these experiments were those that contain ten per cent of phosphoric acid, twelve and one-half per cent of nitrogen, and ten per cent of potash instead of two per cent. One dollar invested in this latter fertilizer will give you fifty per cent greater income in the way of increase of your crop than one dollar invested in the fertilizer of standard manufacture. That is saying nothing against their goods. It is simply that they are working on the wrong basis, and they are beginning to realize this fact. If you look at the analysis of fertilizers of the standard make, you will see that they are increasing the per cent of phosphate in their goods. The experiment stations of New

England are exerting a great influence on these manufactures, because it is being found, not only in New Hampshire but in other states in this drift region where the soil is of the same nature as in New Hampshire, that the fertilizers with the greater amount of potash in them are the best.

There is one thing that I want to call your attention to right here. If the farmers of New Hampshire do not put into practical use the results found at the experiment station, then the experiment station will never amount to anything to you as farmers. We may carry on the most careful work at Hanover and arrive at conclusions which are correct,—we will admit that they are correct,—now, unless the farmers accept the conclusions that come from these experiments, they never will be of any use to the agriculture of New Hampshire. That applies to these fertilizers as well as to other things. Unless you put to practical use and test the facts that we believe we have found in these experiments, they will never do any good. The experiment station can do its work, but the farmers must do their work also. So far as is possible, the experiment stations are working in the direction of practical results for the benefit of the practical farmer.

To pass on to another bulletin, bulletin No. 7. That created more sensation in the state of New Hampshire than any other thing that we have done. It was the one thing that was talked about for some time. The subject matter of that bulletin was the testing of dairy apparatus.

Bulletin No. 8 gives the results of feeding experiments with reference to the production of milk. It is a continuation of the work set forth in No. 4. We expect soon to issue another bulletin, carrying on that work still farther.

On No. 9, I consider we have done the most careful work of any of the bulletins we have issued, so far as care and accuracy of the work is concerned. The subject is the effect of food upon milk. Ninety per cent, I think, of the farmers of New Hampshire to-day do not believe the conclusions arrived at in that bulletin. Yet the conclusions are sustained by the work of others who have been experimenting in that same line. The

farmer generally believes that the change of food affects the richness of the milk. Soon after this bulletin had been issued, I spoke upon this subject at the meeting of the Dairymen's association in Vermont. I said, "If there are any five men in this audience that will agree among themselves as to some definite line of procedure, which they consider will reduce the richness of the milk, I will immediately inaugurate a series of experiments that shall test that particular thing." It is a fact, that the richness of the milk cannot be materially affected by changes of the food. I believe that thoroughly. I am obliged to believe it. I did not believe it ten years ago any more than many of you do now, but I have been driven to this conclusion by actual tests. You can build up a breed of cows that will give richer milk; but given two cows whose milk is of the same richness, and give them such food as will, if possible, affect the quality of the milk and affect it differently—that is, feed differently to each cow—and you will find that from day to day, month to month, and year to year, there will be no material difference in the quality of the milk from those two cows. Certain changes that cannot be attributed to anything in particular, there are. But the changes of food do not materially affect the quality of the milk.

MR. PHILBRICK: You have started with balanced rations in the first instance?

PROF. WHITCHER: No. I do not start with balanced rations, if you mean by that according to the general standard.

Perhaps I ought to make one statement in this connection. That is, that in these experiments the cows should be well fed—have a sufficient amount of nourishment. I do not mean to starve the cow. It does not make any difference whether she is fed on cotton-seed meal, or on corn meal, or shorts, or anything else, provided she gets daily a sufficient amount of nourishment to run the machine and make the milk.

MR. PHILBRICK: I want to ask you one question more. Do I understand from your statement that every cow is born with a certain limit of capacity; and if the food she receives

produces milk of the quality of the limit of her capacity, any subsequent change cannot vary it?

PROF. WHITCHER: Let me ask you what you mean by limit of capacity—as to quantity or quality?

MR. PHILBRICK: Quality.

PROF. WHITCHER: I mean to say that every cow is so constituted that she will give milk of a certain average capacity as to composition. No matter whether she is fed on cotton-seed or shorts, the richness of the milk will be the same. There is a constant increase in the richness of her milk, which is not due in any sense to the manner of feeding. The longer time a cow is in milk, the richer that milk will be. Secondly, as cows grow older there is a change in the average composition of the milk. What I mean to say is this, that if you feed a given cow in a certain way, the milk will not be the richer or poorer for it. A heifer will not give as rich milk as a cow four years old.

There is another point that I wish to allude to, that has reference to certain changes which take place in the composition of a cow's milk. The cow that gives you a very large quantity of milk, as a rule, does not give very rich milk. At certain seasons of the year, too, they give richer milk than at certain other seasons of the year. The experiments, however, show that there certainly is no appreciable diminution in the richness of the milk when you change from dry food to succulent, in fact, the experiments show a slight increase at such times rather than a decrease.

QUESTION: Will the change in food in any way affect the sanitary value of the milk?

PROF. WHITCHER: Yes, sir. I presume there is a point there. I cannot give you any definite information in regard to that, however. But so far as the flavor and healthfulness of the milk is concerned, I think it can be affected by the food. Of course the cows should have wholesome food. Anything that would affect the physical condition of the cow, would affect the milk in that way.

PROF. BREWER: I will admit all you say in regard to the

chemical composition of the milk, etc. But were there any experiments made on the characteristics of the fats and cheesy part? The question just asked in regard to the sanitary condition of the milk suggests that question. It has been demonstrated that, by feeding a cow swill slops,—I do not mean brewers' grains,—the amount of cheesy matter in the milk is not diminished and certain persons have argued from chemical analysis that milk from such a cow was as good as any other. On the other hand, I think that in making cheese it has been found that it will not make as good cheese. It behaves differently. I can imagine that the difference may be too slight to be detected by chemical analysis and yet the difference would have an important effect in determining the character of the product. For instance, chemistry may fail to detect any onions or garlic in the milk, and yet the taste will creep into the butter. It suggested itself to me that the unsanitary qualities of the milk might act in the same way—would not be detected in milk, but would have an evil effect upon the human system.

PROF. WHITCHER: That point is a very important one. In the way that I treated the subject, however, that would not come in. In the case of swill-fed cows there are two points to be considered. The constitution of the cow is not kept up. In order to get the amount of nourishment necessary you are obliged to give a very large excess of water, more than is required for her system. There is a certain definite relation between the quantity of water and dry substance, and if you overload her system with water you get her into an unhealthy condition. There is another point. This is the day of microbes. Everything that goes wrong in the world is attributed to microbes. And why should not we? We find that germs of disease get into the system of the cow and are carried to the milk. There may be germs of disease in the swill and there may be a direct transfer of some disease in the case of typhoid fever. This much is true. The germs of typhoid fever have been traced very certainly through the system of the cow to the human subject, and there you get typhoid fever. There

is another point that comes up here in connection with the subject of milk, and I want to speak of it, because it is a point that ought to be taken into consideration by the legislature. It is with reference to tuberculosis. The germ of tuberculosis, if it gets into the lungs and system, will often terminate in consumption, and if there is anything we want to avoid it is consumption. Although at the present time there is every reason to suppose that the discoveries of Dr. Koch will, to a great extent, check that disease, this subject should be carefully considered in the interests of health. As the gentleman says, there may be things in the milk that the analysis of the chemist will not discover.

A MEMBER: Three years ago, when we started our creamery, we ran for two or three weeks and it took a certain amount of milk to make a pound of butter. Suddenly, the next week it took a larger quantity of milk to make a pound of butter. Our man that ran the creamery found fault with the separator. It was discovered, however, that down next to us they had the same trouble with their separator—that it took a good deal more milk to make a pound of butter that week than it did the week before. Come to find out, the week that it took so much milk to make a pound of butter, it rained the whole week, and those cows were out at pasture.

PROF. WHITCHER: Professor Roberts made some experiments at the Ithaca Station in New York that seemed to show that stormy weather had some effect on milk, but I do not think it is attributed in any way, shape, or manner to the food. It may affect the nervous system of the cow and thereby affect the milk. There may be something of that kind from stormy weather, but I very much doubt if you would find that sufficient to noticeably affect it. I should suspect that, if you got at the bottom of the matter, there was some other reason, aside from the mere fact of stormy weather. Sometimes milk is affected by the excess of water, when the water does not come in contact with the cow.

MR. GERRISH: You said something about increased richness of milk as the heifers advanced in years. Have your

experiments been made with older cows, so that you can draw any line at the point where they generally begin to fail?

PROF. WHITCHER: Personally, not. But as I understand the matter, the decline does not commence until the animal begins to get along in years—at the time when her system begins to fail.

MR. CURTIS: It is just so with the heifer? She gives richer and richer milk until she stops growing?

PROF. WHITCHER: Yes, sir. So, too, if the animal is sick, she may give a different quality of milk. But so far as she is healthy, the food does not affect the quality of the milk.

PROF. BREWER: I should like to add one word to what has been said. I have been indirectly connected with the Connecticut Station for a long time. We were the first state in the Union to have an agricultural experiment station. We commenced with the farmers about eighteen years ago, and talked up the matter of an experiment station with them. We work in a somewhat different line from what they do here, partly because of the situation and partly because of the laws.

I have seen from time to time the bulletins of that station. Their work has not been all original work. They have done a good deal of work that every and any station does, and which they must do in order to do their duty, although, perhaps, you may not see any practical results. Some of the work is negative work, that is, work that they have to do in order to prove that certain things cannot be done. Then, too, there is a good deal of scientific work in which the results come about but slowly. But I think, if you will take their work during the years they have run and see the advance that has been made in agricultural science, you can appreciate to some extent the value of the experiment stations.

There is a good deal of work that cannot be done by the farmer, because he has not the means or the time to devote to it; and there is a good deal of work that can be done by the farmer that no station can do so well. This is a coöperative work. The station has the scientific part of the work to do, and the farmers themselves have to make the applications and

put into practice the results of the work done there. As I have been listening to this discussion, I have a slight suspicion that the farmers and the professors misunderstand each other. Now, the professor works in the laboratory, and certainly does good chemical work. The farmer works in his fields and around his dairy. I believe that it is for the farmer, and for him alone, to manage his dairy so as to improve the quality of the butter. It is the station's business, and that is just what the station is trying to do, to show the farmer how to get the largest amount of butter from his milk. The making of good butter is an art, and the farmers are the ones to acquire proficiency in that art. It is his business to become skilled in making the best quality of butter, and that is just what he is doing. I think the fact that a very little onion or something of that kind has such an effect on the butter often leads the farmers to over-rate the influence of food upon the chemical composition of milk. That is my impression.

THE PRESIDENT: I now have the pleasure of introducing Dr. George M. Twitchell, of Fairfield, Maine, lecturer of the Maine State Grange and Secretary of the Maine State Agricultural society, who will address you on "Profits in the Poultry Yard."

PROFITS OF THE POULTRY YARD.

BY DR. G. M. TWITCHELL, FAIRFIELD, ME.

Mr. President, Ladies and Gentlemen, of New Hampshire:

As I was sitting in the back of the hall, looking over the audience, I felt as though the people were not present that I wanted to talk to. Your honorable secretary has asked me to speak upon the business side of the poultry question.

Now, the gentlemen and ladies who are present and engaged in poultry raising are interested in it perhaps not as a business, but are those who have been giving it some study from a scientific point of view.

I am asked to treat the question from the every-day, working farmers' standpoint, and, therefore, if I do not take up

phases of the question along the lines you have been working, I trust that it may not be uninteresting to you, and also that the report may reach a larger section and those who are looking for a livelihood in this business. I would that I might speak directly to the farmers of New Hampshire.

I think, Mr. President, that I may very likely repeat some of the things said last winter, although I have been particular not to read that part of your report, for fear I might be the more apt to incorporate some of it into this talk.

A building for fifty hens should not cost over thirty-five or forty dollars. Such a building, ten by twenty feet with a door at one end, can be finished up complete and ready for occupancy for that sum. First upon the ground put a foot of small stones, if you have any, then upon those place the sills, and the drainage will be complete.

QUESTION: How large would you have the building?

DR. TWITCHELL: Ten by twenty feet. I would not allow more than five foot space to the hen. That allows for forty to fifty hens.

QUESTION: Would you advise keeping fifty in one flock?

DR. TWITCHELL: That depends upon how much time you can give to them. If I were going to keep a thousand hens, I should make about a dozen or more of those houses six rods apart; divide the number among those buildings and shut them in for forty-eight hours. After letting them out, you would be surprised to see how they will find their way home. Each one will return to its own place at night.

QUESTION: Would you have artificial heat in the winter?

DR. TWITCHELL: No, sir. I do not believe it is profitable for the farmer, unless doing a heavy business occupying his entire time. There are many things which enter into that question, in order that an intelligent answer may be given.

MR. GERRISH: Have you ever seen any trouble arising from too much glass in the hen-house?

DR. TWITCHELL: Yes. In a building of that kind one or two windows on the side would be enough, the glass being eight by ten or ten by twelve—twelve lights.

MR. GERRISH: Would you put in double windows?

DR. TWITCHELL: If I wished to go to that expense. But you would be surprised to find how comfortable a building of the kind I have described would be with fifty hens in it. Of course, water would freeze under the windows, but it would not be cold enough there to freeze the combs. I rather the temperature would run down a little than to have it too warm. I do not want the temperature in my hen-house to be above 40°. If it is too warm it has a tendency to weaken the condition of the hens.

MR. THOMPSON: Would not the temperature be a little different according to the breed of hens you have?

DR. TWITCHELL: Of course; if you have hens with large combs, there would be more danger of those combs freezing. But with fifty hens in a hen-house such as I have described, you could get considerable warmth. The difficulty with artificial heat is to maintain an even temperature, something which must be done to preserve health.

MR. THOMPSON: From what breed do you get the best results?

DR. TWITCHELL: That depends upon what your fancy is—whether you are working for eggs or poultry. I was interested in an article that I have seen, written, I think, by Brother Connor, in which he gave a smart blow to this general purpose business, and I want to indorse it. There is no room for general purpose to-day, whether it is in breeding dairy cows, in keeping horses or hens. We want to find out what we have the best adaptability for and work for that. Then you want to get a machine that is best fitted for your purposes. A manufacturer of a certain kind of cloth selects the looms that are best fitted for manufacturing that cloth, and so the person who undertakes to do anything with hens, first wants to decide whether he will work for eggs, or to raise chickens for the market, and then select that breed which is best fitted for the special work. After all, it is not so much the breed as the individual hen. Yet, by selecting with care, you may avail yourselves of work done by others in the past

and so save time. To repeat, this thought of breeding for a general purpose has no place in the market to-day. The general purpose idea has no place anywhere, whether it is in education or in the raising of stock. We, who are keeping hens, want our fowls to do a certain kind of work. One family may be fitted for egg producers, and another, at the same time, have tendencies which make them good for poultry, because these have been bred with the main thought of making poultry, and we must take advantage of that previous work. There was a time when this general purpose idea was good, but not to-day. Conditions are constantly changing, and we must change our practices of farming to accord with them.

Egg producers have a longer and narrower body with legs nearer together, a body adapted for egg building; but for poultry you want a wide body, square on the back, legs apart, and a full, deep, broad breast. You want a body that, when dressed, shall give the smallest per cent of waste possible and the heaviest weight. You cannot combine those two features and secure the highest excellence in either. It is only by keeping the two types separate that we can get the best results in breeding in either line. When it comes near the breeding season, the time when you want to raise your chicks, go out and select from your flock, of say fifty hens, those that are adapted to the end you have in view, and get a pure bred male to put with them. It is in that way that I believe the farmer can do the best—make the most money. The ordinary farmer cannot well go out and buy a flock of pure blood hens and be able to continue the standard of the pure blood breeder who preceeded him; but he may improve the quality of his own stock by buying a pure bred male, and in that way obtain the benefit of the years of breeding which has brought the breed up to that high standard of egg production or flesh forming, as the case may be. In this way a man will at once increase the number of his eggs or the weight of his fowls. In this way the specialist becomes a public benefactor, and you reap the full fruit of all his years of patient effort. Select a dozen of

your best hens and put by themselves, putting your pure bred male with them. If a farmer wants to get a flock of pullets that will give him the largest number of eggs, then his selection from the breeding stock must be from among the very best layers.

Another thing that I wish to say in this connection. In order to improve the excellence of your flock, it will be necessary to be continually weeding, weeding, weeding, just as you have to keep killing or selling from a herd of cows, in order that the average of the whole may be increased, and individual merit secured.

Next, we come to the question of feeding. Here is a problem very easy for me to solve in theory, but difficult to carry out in practice. It is very easy to say, feed egg food, if you want eggs, and to name the kind of food best adapted to the producing of eggs; but at the same time, I have found that in attempting to carry this out, it is a very difficult thing to feed so as to get the eggs. If these problems could be easily solved they would lose all interest. We have injured our flocks in the past and also the standard of the product, by feeding so much corn. Feed more oats, more wheat, more barley, and some corn; feed meat scraps, and vegetables, feed clover in abundance.

MR. PHILBRICK: Potatoes?

DR. TWITCHELL: All vegetables.

MR. PHILBRICK: Boil your potatoes or feed them raw?

DR. TWITCHELL: Feed nothing raw, except occasionally some onions and chopped cabbage.

QUESTION: Feed meat?

DR. TWITCHELL: Meat scraps every day to the amount of five per cent of the cooked food.

MR. PHILBRICK: Is that raw or cooked?

DR. TWITCHELL: Cooked—scraps that have been cooked. I have made some experiments with meat scraps and also with animal meal, and I have the impression that the meal is more valuable because there is less per cent of water in it.

MR. THOMPSON: I wish to ask the question whether the Leghorn will eat more than the larger breed?

DR. TWITCHELL: I don't think they will eat any more than the Plymouth Rock, the Wyandotte or the Brahmas; but I do think they would eat more than I should give the larger breeds, for if fed liberally these take on fat. The Leghorns are so active that they will take care of all you give them, and that is one objection, perhaps, to the breed. It would be with me because I want to study the cost of production.

QUESTION: Then you would not feed more to the heavier breed than to the lighter ones?

DR. TWITCHELL: No. I have been surprised in feeding reduced rations to see how my hens would respond. I am confident I have wasted dollars in feeding. When we are keeping hens on two mills and a half a day, we are not wasting much. For the last few years that I was keeping a few hundred—I am not now—I found that I could keep them for less than that.

QUESTION: Did you say you would feed meat scraps?

DR. TWITCHELL: Yes, with the cooked food. I would feed cooked food in the morning the first thing, cooking it over night if I could do so, and stirring up together the vegetables and meat scraps, and then feed in the morning. I would not feed a large quantity to them, but just enough to warm them up, and then let them be kept busy searching for the whole grain. The very best invigorator is work.

MR. GERRISH: Have you said anything about feeding unthreshed grains?

DR. TWITCHELL: That is valuable. I do not know where you can find anything more so. Mix barley, oats, and wheat together and then feed a small fork full of the unthreshed straw to the hens daily.

If you feed at six o'clock in the morning with the cooked ration then from nine to ten give them a fork full of that feed, and let them work on that until about three or four o'clock in the afternoon, and then rake into the dirt a little corn, you would be giving them about the right quantity of food and the exercise they get will keep them from fattening and in condition to lay eggs. There is much in this, hens that are

fat cannot lay. Exercise is the best drug to be fed the flocks.

QUESTION: Would you feed ensilage?

DR. TWITCHELL: I have not fed ensilage. Second crop of clover is about as good as anything you can feed. If I was going to store it for winter use, I would store as ensilage.

MR. CONNOR: Don't you think a bedding of leaves would be a pretty good thing, and then throw the grain into that? That would give them as much exercise?

DR. TWITCHELL: Those leaves would get soiled quickly, and very soon become damp. I never like leaves. I used a dry earth, and cleaned out my pens thoroughly twice a week.

MR. THOMPSON: You say you would not use a wooden floor?

DR. TWITCHELL: I would not.

MR. THOMPSON: What would you do for drainage?

DR. TWITCHELL: You might have a little trench dug around outside of the house for surface water.

MR. THOMPSON: Would not the surface become damp, even in that case?

DR. TWITCHELL: No. In the building I have described you are up a foot from the ground. I would put in a foot of stones, and then on this four inches of dirt, which would be kept dry. This makes a valuable fertilizer in the spring.

The matter of rations is a perplexing one. Professor Whitcher has been speaking of it this afternoon with reference to cows. It is just as applicable here as in any other stock. It is for you individually to decide what kind and what quantity you should feed your poultry. Every man must be a law unto himself. As we take the flocks, watch over, care for, and feed them, seeking only their best health,—because that insures the highest state of production,—we shall find that we are all the time reducing the rations and adapting them to the need of the animals. This is the great problem of to-day, to know how, and what to feed.

QUESTION: Would you feed buckwheat?

DR. TWITCHELL: That would be fattening. I would feed that when I came to fatten chickens.

There is a word that I wish to say in regard to the manner of handling chicks. The common way would be to hatch the broods, letting the pullets and roosters run together with the mother and feeding liberally on corn and other kinds of grain, with the one thought of sending the cockerels to market in good condition and at an early age. Once start the current in that direction it is a very difficult matter to turn it back. The chickens should be separated as soon as you can determine the sexes. Put the young cockerels where they will make rapid growth. When they are ten weeks, twelve weeks, or fourteen weeks old they ought to be ready for the market. A pound of chicken at thirty-five cents, is worth a good deal more to the grower than five pounds at fifteen cents. You want to put these broilers upon the market in the early spring. I think if we made it a rule to sell our male birds before they were four months old, we should find more profit in the business than we do to-day. In the separation of the sexes, we shall also find that the pullets will do better than if allowed to run and fatten with the cockerels. Unless you separate them, giving the pullets a wider, freer range and coarser food, they will mature in advance of the cockerels, fatten, lay a few eggs, and then stop, because they are not in condition for egg building for they have been fed on fattening food.

MR. THOMPSON: Do you believe that the average farmer can use an incubator successfully?

DR. TWITCHELL: That is a question for the man to decide for himself. One will succeed, another fail. One uses only hens and grows ten thousand yearly; another hatches all in a machine. It is simply a problem for the individual to study and decide for himself. Right here we may find the explanation for the success or failure of men in all walks in life. This is only one little path, but it is one where a man must walk erect and in the conscious knowledge of his own powers in order to succeed.

There is no question about the hatching of the chickens in the incubator. The trouble is in taking care of them afterwards.

There are two or three men in the State of Maine who are carrying a thousand hens each, and are giving special attention to this matter of breeding. In looking over one of these men's accounts the other day I found that his thousand hens had netted him a thousand dollars yearly. That is pretty good compensation for one year's work. Yet there are many who are trying to raise a little of this or that crop upon farms which are hardly fit for anything else except a run for chickens. I have thought, as I came along past these hills, how many places I could see where nothing is growing, but where a man could start a poultry ranch, keep a thousand hens and make a success. Right along with his poultry he could carry his plum trees. You can fence in the orchard and let the chickens run among the trees. The hens and the plum trees will work together admirably. They will be firm friends. The trees shade the ground, and the hens take care of the insects. An experiment was made where a man having an orchard fenced part of it and allowed the hens to run there, while from the remainder they were kept away. The result was that on the part fenced the loss by insects was two per cent, while outside it was sixty, showing that the hens did their work, and did it well. The man who has a plum orchard and intends to realize from it, should keep hens and turn them there, as in that way he will secure a better crop, and protect the trees from insects. It will pay if the hens fail to produce an egg.

In the summer time colonize and get the hens away from their winter quarters. Do this by building portable buildings, the description of which I think you will find in last year's report. Moving these to a new position every two or three days the chickens will return at night, and everything will be sweet and healthy.

There is plenty of room in this poultry business, but do not think of going into it on an extensive scale if you think of doing anything else. It is an exacting business. The hens must be fed from three to five times a day. It does not do to neglect them at all, for, if you do, you lose something every

time. Do not think of relaxing your diligence a moment. How many men have attempted to start in this business, but failed because they did not continue in well doing. If you go into anything, you want to do the best you can with it and continue to work at it, until, at least, you have assured yourselves that you cannot make a success. The trouble with a good many men who carry on farms is that they try a thing once, and if they don't succeed in that they give it up and try something else; and because they do not realize all they expected to, change again.

This matter of artificial work is something entirely different from the ordinary business of keeping poultry, and it is useless to attempt to combine the two, because no man has time enough to attend to all the details. That is one of the obstacles in the way of success with artificial hatching—the rearing is a difficult matter. Yet, if there is a young man here who wants a good paying business, there is no better opportunity open anywhere on the face of the earth than this business of artificial poultry raising, either with chickens or ducks. Ducks may pay better than chickens, but they call for still closer application in taking care of them. It is my experience that nothing in this world is worth having, unless there is something we have to give in return; and the more we get out of anything, the more we give. It is just so here. The more you make, the more care you will have to take, and the closer the application must be.

You can build the buildings necessary for the hatching and taking care of three thousand chickens and ducks for from one thousand to twelve hundred dollars. Some of the sandy land that will not grow anything else is just the place where you want to do this work, for the soil is warm and dry. A great many men are engaged in this business of duck raising to-day. One intends this year to put on the market ten thousand ducklings, marketing them when nine weeks old. Last year he kept three or four men picking all the season. Those ducklings were grown at a cost to him of five to six cents a pound, and the average price for the season was

twenty cents. A farmer who was getting five dollars a barrel for his apples, said that he was "making a fair living profit." That man growing ducks is making a fair living profit, and why should not your boys here in New Hampshire be engaged in that business, which is surely profitable, and reclaiming and making valuable these light soils.

One thought I have not yet touched upon, and that is in regard to the dressing. The value of that, of course, depends upon what you feed your poultry. With the hens properly fed, if protected from the wet, the sweepings from the floorings under the roosts removed every two days and put into boxes or barrels, it would be worth about a dollar a barrel. This would be at the rate of forty cents a hen yearly, sufficient to half pay for the expense of keeping, and it is something that should be taken into account in this reckoning of the profits of poultry industry.

I do not know of a man engaged in the business, who has followed it for five years, who is not realizing to-day from a dollar and twenty-five cents to two dollars per hen. Is not this a good business to be entered on and carried forward in some of this light soil? Is there not a good opportunity in the State of New Hampshire, as in the State of Maine, to engage in an industry promising so much? But, says one, how about over-production? Gentlemen, I know of farmers who have been waiting twenty years to engage in a certain line of farm work, and they have not yet been able to decide, and are waiting now, because they were afraid of over-production. Put upon the market an article that is first-class and that can be depended upon, and you need have no fear of over-production.

QUESTION: What do you do for the roup?

DR. TWITCHELL: That is a troublesome thing, and the best way to deal with it is to keep it out, if possible. Keep your fowls clean, and be very careful about those you purchase outside. If any indications of sickness appear remove from the pens at once.

QUESTION: Do you fumigate for it at all?

DR. TWITCHELL: Yes, during the summer months. I have advocated the colonization of the hens during the summer months. Having done this, I would give the buildings a whitewashing once in two or three months. Then kerosene the roosts until you have killed the vermin.

MR. CURTIS: There is one point that I would like to call your attention to, and that is this: in feeding stock, we find that it is necessary to consider the bulk as well as the amount of nutrition in the food; it is necessary to have the stomach extended to a certain extent in order to have it work well. Is not that true in regard to your chickens? I saw a statement made by a writer on this subject and he said that if you find that you are overfeeding, do not reduce the quantity, but the quality of the food. Feed enough to fill their crops every time, but do not put so much nutrition in.

DR. TWITCHELL: I intended to convey that idea, when I said that we should feed vegetables and clover. Feed the less concentrated food in connection with the more concentrated and thus provide the quantity necessary. My own practice was to feed my hens in little cribs provided for the purpose, intending to put enough food in so that they will eat it readily and go away. You will find that your hens will eat for a few minutes, perhaps five, and then fall back and after remaining a few minutes will come back and eat more. See to it that the first time they go away that crib will be empty. That is what I meant when I said that I could not give the exact ration for a flock, because they vary. Some will take more food than others. In the morning give a mixed ration of cooked oats, corn, and wheat, with vegetables or clover, using about ten per cent of linseed and also about five of meat scraps.

QUESTION: Do you ever cook apples for them?

DR. TWITCHELL: Yes, sir, every thing and anything in the line of vegetables.

QUESTION: Do you prefer them cooked or raw?

DR. TWITCHELL: I would generally cook, although I sometimes would feed vegetables raw, especially cabbages. Cook the vegetables and the clover as a rule, and feed raw as the exception.

MR. THOMPSON: Sometimes it is asked, what is good for hens when they pick their feathers.

DR. TWITCHELL: I never have had any trouble with that. I never saw it in my flocks during the twenty years or more that I have been breeding. I do not know why, unless it is that they have had a variety of food and plenty of work. It is usually caused by want of something in the food or by idleness.

MR. THOMPSON: I have been told that it was from the want of salt.

DR. TWITCHELL: A very little in the cooked food is good. This trouble may often be caused by want of meat rather than anything else.

QUESTION: Artificial heat would not have the effect of causing them to pick their feathers?

DR. TWITCHELL: I don't think it would. Artificial heat would have the effect of lowering the vitality of the animal.

MR. THOMPSON: Don't you think, as a general rule, we do not use water clean enough?

DR. TWITCHELL: Yes. Always give fresh water three times a day.

QUESTION: Would you feed skimmed milk?

DR. TWITCHELL: Yes, that is valuable. There is no place where skimmed milk will pay better than in feeding chickens, but you would need to take away its equivalent in the grain fed, else there will be trouble. It is food not waste product.

QUESTION: For those who have made a reputation for their eggs and poultry, do you find it easy for them to realize from one dollar and fifty cents to two dollars per hen?

DR. TWITCHELL: Yes, sir, there is no question about that being done. You ought to be able to do it here with good markets all about you. If you have eggs that you can guarantee are not over three days old, you will find parties who will buy them and pay you more than the market price for the sake of having an article that they know is fresh. I know of a man who during the whole year, and for several years, has sold his eggs for thirty-five cents a dozen.

QUESTION: Will the food affect the quality of your eggs?

DR. TWITCHELL: Yes, just as it will affect the quality of your milk. An egg is made from the food given, it is flavored by the flavors in what the hen eats. This is true everywhere.

QUESTION: In feeding skimmed milk, would you reduce it to a curd?

DR. TWITCHELL: Feed both ways. It is valuable anywhere, though the fresher it is the less the loss in food nutrients. We have but touched this question in the hour assigned us, yet I hope I have been able to inspire a little courage to go out and labor for that higher success which attends more earnest effort. I would that I might have spoken to-day to the young men, or those struggling on these hillside farms finding difficulties at every turn, because the problem of successful poultry culture is especially adapted to them, because without calling for an extended outlay it insures substantial returns. It is a practical every day business and it matters not where one is located there is sure to come a fair measure of profit, while he who saves and utilizes the waste will find his future crops nourished and fertility improving. There is so much in this question, in its bearing upon the fruit problem and these waste lands, that I feel to urge it upon your young men as worthy their careful consideration. Right here on these light soils, by adapting our labors to the conditions prevailing, we may find that larger measure of profit, for which so many have gone long distances only to return empty handed. Instead of stumbling over opportunities at our feet let us seize them, and make of these, stepping-stones to greater prosperity. In doing this the herds and flocks will increase among these granite hills; the problem of to-day will be solved and a generation will arise to call us blessed.

EVENING SESSION.

The meeting was called to order at 7.45. Governor Tuttle, who was on the programme to address the meeting at that time, being absent, Dr. Twitchell was called upon by the president to make a few remarks.

THE PRESIDENT: I regret very much, ladies and gentlemen, to have to make an apology on account of the Governor not being here this evening. It was understood that he would be present, when the program was made, and we supposed he was to be here until a short time ago. But through some misunderstanding he had made arrangements to attend a meeting at another place and was obliged to do so. We have pressed into service, however, Dr. Twitchell, a gentleman, who, I know, will have something interesting to say.

DR. TWITCHELL.

Mr. President, Ladies and Gentlemen:

This is the first time, I believe, that I ever have had the pleasure of standing in a governor's shoes. At a moment's notice to be forced into service is not pleasant, when I know what you had good reason to expect, I regret that we are not to have the great pleasure of listening to words of counsel from your honored Chief Magistrate, and also that you must listen to me for even a few minutes more.

THE PRESIDENT: It was because you always talk well.

DR. TWITCHELL: This morning I had the pleasure of listening to the worthy master of your State Grange, Brother McDaniel, and this afternoon to questions presented by the director of the New Hampshire Experiment Station, and I have noticed, what I think you must all have seen, that the speakers one and all were aiming at some practical results, striving to give suggestions that would be of benefit to the farmers of New Hampshire.

I do not know just how you are situated here, but if I speak to you a few minutes it must be as I would talk to the farmers in the State of Maine. Agriculture to-day is in a peculiar condition; it is just passing through a critical period, and a combination of circumstances seems to have arisen, placing heavy burdens upon those who are interested in this work in New England. The West has been pouring into our markets its products in such quantities and at such prices as to effectually compete with our Eastern farmers and drive

our efforts into new channels. Where is relief to be had? Where and how can we find the products by which we can hold our own? This is a question that is staring every intelligent farmer in the face, and it is this we are all trying to solve.

I have one thought in my mind just now, that I would like to touch upon. I believe the present condition of agriculture is very largely due to the education of the past. If your text-books are like ours, you will find that from the primer to the higher English they are all tinged with metropolitan thoughts and ideas, and with hardly an allusion to farm life. The influence of these books is away from the farm. The boys and girls from early boyhood and girlhood have been brought in contact with metropolitan ideas and aspirations, and we have let go one of the most powerful levers by which we might lift the agricultural thought to a higher level. It is no wonder that so many have gone away from the farm home. Again, over and above that, is the fact, that in so many homes they have had drilled into them from Monday morning until Saturday night the hardships of farm life. Fathers and mothers have too often thrown the power of their influence, unconsciously, it is true, but nevertheless against the farm home, and New England is to-day feeling the drain that is continually going on, from the country into the city.

Where is the relief? I think, in the first place, it must be found in the introduction into our schools of text-books which shall turn back this current, in a measure; books which shall show the bright side of nature, and the advantages and pleasures arising from an agricultural occupation. I believe, if we put ourselves to the work, we can find books suitable for this, those emphasizing the importance of natural things, and so leading to a love of the same. In that way we can lead to a better knowledge of agriculture and imbue the young people with a desire to know more and more about it. The subject of agriculture does not need to be mentioned in these text-books. Any child reading a book of this nature would not only be disciplined but also interested. Just at the

age when what they read makes the greatest impression upon the mind, they would be receiving an object lesson and seeing a new aspect of that life, with which we desire they may be constantly brought in contact. Surely this would be a stepping-stone for something more, and in the right direction.

You are doing a work through your Agricultural college, or seeking to do it; but are you reaching the boys of New Hampshire? I do not know the size of the class under instruction at that college, but I understand that it is very small. Somehow the boys seem to feel, as soon as they set out to get an education, that it must be in some other lines. We want to inspire them with a desire to go to the Agricultural college, there to be prepared to go out and demonstrate upon the farms the instructions they have received. How shall we do it? It seems to me that we have got to begin down at the foundation, and, through influencing their young minds, interest them in the life of these natural things which lead directly towards agriculture. By doing that, as they grow up to manhood, they will naturally turn to the Agricultural college for instruction in special lines.

Here is work for us to do, for it is of the highest importance that we should devise some means by which we can prevail upon our young men to stay at home on the farm. Men say there is no profit in agriculture. How do they know that? Who can stand and say, I know that there is no profit in agriculture? The fact is we have not managed this, it seems to me, as a business. We have lived upon the farm and gathered there our subsistence, but we do not, as a rule, set about it in a manner whereby we can fully measure the results constantly flowing in. When we conduct it on business principles, it will be more easy to keep the boys at home.

I speak of this subject, because it is one that is in my mind continually. When I see the boys in my own State driven from home by the teaching as well as the example of so many parents, and finding, as they too often do, only disappointment in the work they enter upon in the city, I wish

something might be done to show them the advantages of the farm and farm life. When I read the story, upon the pages of the reports of the Board of Agriculture, of the number of farms which have been deserted, it seems as though there was work for us to do and that it needed to be done at once. These farms can be made a source of revenue. These farms can be made to yield a livelihood to the farmer. There are young men looking about them for some means of subsistence, for a business in which to cast all their energies. We should show them that there is something besides hard work for the man that enters upon the work of a farm. The man who enters upon that work will be lifted up continually in his thought and manhood because of the agents operating around him. The mysteries that crowd in upon him on every hand give food for thought. Because we have not looked after these as we should; because we have not come into the knowledge of nature's mysteries, as we ought,—we have found agriculture wanting one of her greatest compensations.

If the same conditions prevail here as prevail in the State of Maine, and I presume they do, here is something to which our attention may well be given—this matter of educating the young. We should use the knowledge and the influence we have, to help stimulate an interest on the part of our boys and girls in farm life and in agriculture. Doing this, I believe we shall find in the end a sure compensation resulting from our faithful labor.

MR. PRESCOTT, of Deerfield: Mr. President, I do not wish to dispute this gentleman's honesty, especially since he comes from the neighboring State of Maine, for they are all honest people down there; but I would like to inquire of him if he has any boys of his own, and if he has brought them up in the way that he has laid out for us. Did he desire to make them all farmers and keep them at home on the farm?

DR. TWITCHELL: You cannot make a boy what you may wish him to be, nor can you change his natural inclinations.

Some boys are by nature fitted for certain lines of work, others, for other lines. Thus it will ever be, and boys from the farm home will, many of them, go out into the professions and into mercantile life, into one field or another. Very many there are whom you knew as boys in New Hampshire, who have gone to the cities and have there made their mark. Their power is felt to-day. They have gone from the farm homes of New Hampshire, and of all New England, and it has been the influence of these homes which has enabled them to be the men they are. It would not be possible, nor would I wish it, that all of our boys should become farmers. But we should seek to make farm life attractive by presenting the bright side to the young, and so leading those who would naturally take to agriculture to remain upon our farms. There are farm homes in the State of New Hampshire where you could not drive the boys away, simply because their fathers have been farmers in earnest and have kept constantly before them that brighter side, by which the compensations have been made real to their lives. Prove to the young man by your teaching and example that here he can win success, and you will hold to these New Hampshire homes; plant but a single doubt, and you destroy all hope. Get out of the shadows of negative work and let your influence be positive, and blessings will come to all.

Prof. W. H. Brewer of New Haven was then introduced, and addressed the meeting upon the subject of "The American Trotting-Horse."

THE AMERICAN TROTTING-HORSE.

BY PROF. WILLIAM H. BREWER, NEW HAVEN, CONN.

The story of the creation and development of the American Trotting-Horse is an instructive one. I have chosen it as a title to this evening's lecture, and will use it to illustrate the broader principles of breeding live stock for profit.

One phase in the revival which will occur on New England farms, and which I believe to be at hand, will be the produc-

tion of better animals as well as more of them. Therefore, I think it desirable to keep the subject of live stock production before our eyes and minds at all our agricultural meetings.

For nearly two centuries, New England bred horses enough for her own use and during a part of that time for a profitable export. Of late years she has been a great consumer of horses grown elsewhere. When she supplied her own wants, the old ideas pertaining to breeding prevailed, there was no science of breeding, the art was very crude, and there were few or no high-bred animals in the country. That was the condition of animal production when the great West was opened up to settlement. Under such conditions the fertile prairies had an enormous advantage over us, but still, horse breeding and sheep breeding for a long time held their own here, only to succumb by the long-continued and more intense competition which was stimulated by the rapid extension of railroads.

But matters have now changed, both as to the status of the competition and the kind of animals the markets call for. The recent advances in science have thrown light on the problems of the stock farm; there is now a science as well as an art of breeding. Under it, the art has advanced greatly and new factors are introduced into the economical problem. Hereafter, I believe that we can compete with the West on more nearly equal terms. Personally, I have no doubt whatever but that the growing of live stock will greatly increase in this State in the future, and under a new regime be again profitable.

Formerly farmers and graziers had a saying that "feed is more than breed," now we know that breed is more than feed; hence, in the future farmers and stock growers must make more account of the differences between good and poor animals than they formerly did. The farmer of to-day sees the applications of science used more obviously in the production of better crops. I wish to impress upon you that science can be equally well applied in the production of better animals. Practical and successful breeding is an art, a high art at that;

but nature works in accordance with definite laws, and there is a science of breeding, which in its way may be as profitably studied by the breeder as agricultural chemistry is by those who till the soil and grow crops.

I have taken the trotter as a sort of text, not because I think many of you will therefore go into the breeding of fast horses, but because the story is a good one to illustrate several points which I think we need to consider. It is instructive in several ways, although much of it will not be new to you.

The American Trotter is a modern breed, created for the new uses that arose incident to the progress of modern civilization. Our ancestors did not have fast trotters, they did not want them, they did not need them. Why they did not want them and consequently did not sooner have them; why this breed has been created; what it has been made out of; the natural laws that have been involved in the establishment and improvement of the breed; and the applications of the same laws to the breeding other domestic animals,—is the story I have to tell.

I do not purpose to discuss the special blood or pedigree of any one famous trotter or any one strain of blood, however noted. That matter is the subject of an abundant literature, and to be of any use in practical breeding needs to be studied closer than is possible in a popular lecture. My aim is rather to describe the causes and influences that led to the production of this new breed, the methods of improvement, the striking results, and the obvious applications.

The domestic horse is an essential factor in our civilization. What kind of a civilization mankind might have reached without horses I do not know, but I do know that it would be very unlike the civilization we actually have. The higher the civilization and the culture of any people, the greater the variety of uses to which horses are applied, and new breeds are developed as new uses arise. The American trotter has come into existence because of new demands and new wants. Better roads, new styles of carriages, new methods of doing business, railroads, telegraphs, new fashions, and new social sentiments have each and all played a prom-

inent part in its production. To do without it longer would have been to check the progress of an advancing civilization.

Horses were unknown at the dawn of history. They are first recorded in Egypt, but there, as in Assyria and among the ancient Hebrews, they appear after the other useful domestic animals. The ox, ass, sheep, and camel are spoken of in the Old Testament Scriptures long before the horse. The Hebrews did not use horses to any extent until Solomon's time, and it was three hundred years after that before the Greeks used cavalry.

The horse of the ancients was a small animal. There are numerous representations of him in Egyptian, Assyrian, Grecian, and other sculptures and writings, so we know pretty well what he was like. A small but hardy beast, like our larger ponies, probably rarely more than fourteen hands high.

Quadrupeds have many gaits or styles of motion, but no other species has so many natural gaits as the horse. The fast gait of the horses of antiquity and indeed of all the species of that genus was the gallop or run. That continued to be the case until well into the present century. They were taught various gaits, but the fast gait was always the gallop or run. For many years I have studied the attitudes of all the ancient horses I have seen represented on statuary, bas-reliefs, coins, medallions, and pictures; and if in motion, they are always walking, galloping, prancing, or pacing; rarely, if ever, trotting.

It is a question whether horses were first used by civilized people for riding or driving. The oldest representations of them show them before chariots; but however that may be, so soon as their use became common they were chiefly used for riding; and when we remember that the ancients rode without stirrups, we need not wonder that they despised a trotter and preferred a broad-backed, well-rounded, galloping animal.

The horse of art, from the earliest Egyptian and Assyrian sculptures down to the present century, was not a swift horse of the type of either the modern runner or trotter. How-

ever much the animals differed, those most prized, as a whole, were strong rather than swift beasts, with heavy necks, broad chests, and the well-rounded buttocks we are all familiar with in the horses of art all down the ages. This is the horse which most artists still like to put in pictures or statues, but which we see in actual use chiefly hauling the dray or in heavy teaming. In that most popular of horse pictures, found in so many homes in the land, representing "Sheridan's Ride," doubtless drawn by an admirer of Greek art, we see the gallant general mounted on a small, chubby-headed, apple-buttocked cart-horse, which he has urged into a frightened gallop, and temporarily going at a rate that would cause him to drop panting before he was the half of the "twenty miles away."

The horse is especially susceptible to the influence of surrounding conditions. When horses become wild and live without the care of man, by natural selection they develop into local native breeds; as instance, the wild horses of South America, the mustangs of Mexico, the wild ponies of the Falkland Islands, and numerous other examples that might be cited. In domestication, surrounded by the various conditions which the artificial life imposes, the species is still more plastic; and in obedience to the varied wants, uses, fashions, and sentiments of society, new types are molded into shape by artificial selection, until there is a vast number of breeds in existence differing from each other more widely than do the breeds of any other domestic species except dogs. The heaviest draft-horses are ten and even twenty times as heavy as the lightest ponies are, and the breeds differ in their endurance, temper, and instincts as much as they do in size and form. Nearly every region has breeds or sub-breeds of its own, the special characteristics of which are in part owing to climate, soil, food, drink, or other local conditions, and in part to man's directing care and his selection for particular qualities.

In the hands of the breeder, the species is especially plastic and is readily molded into new forms and new breeds. As

the needs of society change, new uses and new breeds of horses are developed to meet the new demand; or as fashions change, old breeds are modified to suit the changed tastes. New breeds are molded or old ones altered to fit new fashions as truly as clothes are, it simply takes a longer time. The breed of race-horses, known as the English thoroughbred, was developed especially for racing. It was created as an implement of sport for an aristocratic class, and for royalty itself. It became also an implement of gambling, and under the incentive of great possible winnings the breed has been gradually developed to its utmost limits of speed, until now it is not only the fleetest on the race-course, but probably the breed is practically finished, and we cannot hope to see its speed materially improved.

The American trotter is a new breed in process of development, now coming into existence to meet new needs in society and new fashions in sport. It is now being molded into shape by an interesting combination of influences, partly for new uses and partly because of new social sentiments.

To trot fast has not, heretofore, been natural to horses. We are in the act of making a breed in which it is the natural fast gait, and the next century will see a breed of trotters with two-minute horses as common as one-minute forty-second runners now are. The breed is in process of evolution, in obedience to definite laws, to meet wants imposed by the new phases of our modern civilization.

Although used for a great variety of purposes, down to this century the horse has had its greatest value as an implement of war and of ceremony. All other uses were subordinate to these. For these uses he was probably brought into Egypt; for these, Solomon imported horses in his day, as Greece, and Spain, and England, and many other countries have later; for these uses there are government establishments for breeding and improving horses still maintained in most European countries.

For more than two thousand years (and that represents a vast number of generations of horses) the most ostensible

use was for war, and until artillery came into use and baggage-wagon trains accompanied armies, the war-horse was essentially a horse for riding or a pack-horse. Neither of these could be a fast trotter.

If for riding, a variety of gaits was very desirable, and many artificial gaits were taught. In the Middle Ages this came to its height, and not only ambling, pacing, and racking were taught, but many others, the very names of which are now forgotten except as they exist in the literature of the times.

This variety of gaits is a most desirable quality in a riding-horse. A change of gait is a great relief to the rider and probably to the horse also. Any one who has had to ride by the hundred leagues on a stretch knows what a relief a change of gait is. With both riding and pack animals I can speak from personal experience, having ridden horse or mule some twelve or fourteen thousand miles in Western explorations. I have worked with pack-trains for hundreds of leagues on a stretch and among the highest of the Rocky Mountains and the Sierra Nevada. Three times I have taken my pack-train beyond even the trails of wild animals to above twelve thousand feet elevation amid the rocks and eternal snows in the trackless desolation of such altitudes. I know of the merits of a riding-horse and of the pack-horse, and for both of these uses the modern trotter is eminently unsuited.

The type or character of the horse population in any community depends, partly on the uses required of the horses, partly upon the habits and customs of the community, and partly upon the fashions set by the higher classes of society. The trotter is essentially a horse to drive, and so long as the chief uses of horses were for riding or carrying a pack, the fast trotter would not be produced nor trotting encouraged, although pacing might be, and actually was.

The horse of war and travel remained for ages essentially a riding-horse. For this certain Oriental breeds, the Persian, Arabian, Turkish, and the Barb, have been noted from

ancient times, and their blood is an ingredient in various modern breeds, the original still constituting, perhaps, the best riding horses in the world. They had the form, strength, endurance, and gait, to eminently qualify them for this; and the instincts to fit them for the companionship of man in the camp and on the march. Between the driver sitting in a wagon and the beast which hauls him along the road, there can be no such companionship and sympathy as between the rider and his horse. Horse and rider are in much closer sympathy. Each feels the every motion of the other; each knows the other's thought; the two seem as but one creature with a single brain and a single purpose. The centaur is a creature of the poet's imagination, but it comes very near a reality.

What an important role the riding-horse has played in the history of mankind can only be appreciated by a study of horses along with that of nations. The Chinese civilization is essentially without horses, no wonder that it never spread far from the basin of its two rivers. So too with the civilizations of India and Japan and all the Buddhist civilizations. Dense populations grew, but they did not use horses to any considerable extent, and without the proper aid of horses, they have lagged behind in the world's progress. Take, on the other hand, the history of Mohammedanism. Mohammed and his followers swept wherever the Arabian horse could carry his armed rider and no further. Other peoples had pushed their conquests by sea as well as by land; but by the horse, and on the horse, the Mohammedan conquests were made; the horse was the real standard-bearer of the crescent, and where the Oriental war-horse was stopped the spread of Mohammedanism was stayed.

The Moors invaded Spain on their Barb horses, and, when they were driven back after several centuries of occupation, it was the men and Mohammedanism that were driven out. The blood of their horses remained, and made the Spanish horses the most noted of Europe, and the part they played in the wars of the times is the theme of many a Spanish ballad.

When the Spanish horse was at its best, then Spain was at her height among nations; and as her horses declined, her national glory waned.

The Spanish adventurers brought their horses to America, and the part they played in the conquest of Peru and Mexico forms one of the most picturesque features of those cruel days. Those Spanish horses were the progenitors of the wild and half wild breeds, which later spread from Patagonia on the south, to the West Indies on the east, and Texas and California on the north. The native Californian horses of thirty years ago showed traces of their Barb origin, notwithstanding all the vicissitudes of fortune they had been subjected to, and, of their riding qualities, I have a vivid recollection of some thousands of miles upon them.

The Indians of the West derived their horses from this stock. Before that, dogs were their only beasts of burden, with which they followed the buffalo in its migrations. The old Catholic Fathers have recorded what feeble people the Indians of the plains then were. Volney, an educated Frenchman, who made a trip in the far West in 1795 to 1798, has told us what they were even then. He compared our Western plains to those of Tartary, which he had also visited, and says, "the likeness would be completed could we see its natives metamorphosed into horsemen," and adds that "this transformation has begun to take place within the last twenty-five or thirty years," that the Sioux were beginning to be mounted on Spanish horses derived from Mexico, and he prophesies that "in half a century more these new Tartars will probably become formidable neighbors, and the settlers beyond the Mississippi will encounter difficulties totally unknown to their ancestors." We know, all too well, how this prediction has been fulfilled. With only dogs as beasts of burden, the tribes were feeble and little to be feared; but with horses, they became a new people—the Arabs of America, the most formidable foe that European civilization has met with in its western march.

The Spanish horses were carried to England to improve her breed of war-horses, and were an important element in the

rise of British power. And they went to Italy and Germany and Holland and France; and wherever they went they helped increase national wealth and national strength.

Remember that all this is about a horse to ride; a horse which when in no hurry would walk, or on the march could trot, amble, rack, or canter, to relieve his own or his rider's tired muscles, or on the run sweep down on the place of the enemy like a whirlwind, and then retreat as swiftly should that be necessary.

Only a running-horse is fit for such work. Try to imagine an Indian raid or an Arab foray on trotting-horses; the very idea strikes one as ludicrous.

Over all Europe the want was essentially the same. With the use of heavy armor in the Middle Ages, a heavier animal was needed; yet he was a charger, a prancing, galloping steed. Imagine a crusader of old, clad in steel, rattling to the combat on a trotter; the suggestion provokes merriment. Even in later times, after armor was discarded, a galloping horse was needed for cavalry; try to imagine the impetuous charge at Balaklava, on trotters.

When artillery and wagon-trains became a part of armies, the want was essentially the same; the heavy horse of the dragoon was fit for the gun-carriage or the baggage-wagon.

The war-horse was a running-horse, and it was the war-horse that stood as the representative of his species from the days when Job's horse snuffed the battle from afar; down through the days of Greek, Persian, and Roman history; down through the Middle Ages; the Thirty Years' War; the wars of Napoleon; and indeed until the present generation, when the locomotive began to draw armies to the battle field. The horse for war, a running-horse, is still the favorite in all those countries where the road to greatness lies through war and conquest. To produce the trotter, it needed a country wooing the arts of peace and seeking greatness by industry and annexation, rather than by plunder and conquest. It was fit that the breed should originate here, no other country developed the needs as we did.

In times of peace, the horse has figured in social ceremonies and as an index of rank, and with the rich, as an implement of sport and a gratification of luxury. In agriculture and as a common beast of draft, he has played but a minor part until within the present century. His improvement for use in peaceful industry received but very slight attention until within a hundred years.

Fashion and sentiments in society have always been an important factor in producing new breeds or improving old breeds of horses. From the time when an ordinary Roman citizen was forbidden to use white horses (and doubtless much earlier than this) there has been a social factor entering into every problem of horse raising. What colored horses might be used by persons of this rank, and of that; who might hunt on horseback, and who might do it only on foot; indeed who might ride at all, and who not, have been the subject of numerous laws for centuries and still exist in some lands.

In all ages the use or possession of the horse has been, in one way or another, an emblem of social position, with pagan, Mohammedan, Jew, and Christian alike. Even now, and in this free country, a carriage and horses means more than the convenience of getting about. I say "carriage and horses," not "horse," for there is a social sentiment, a tradition of the Old World, that to be driven behind two horses is more respectable than to drive behind one. I am acquainted with good Christian people, who can ride to the store or to market behind one horse on week days, but on Sundays they feel that their social position requires them to worship with two horses. We see an evidence of this sentiment regarding the dignity of a span, as contrasted with a single animal, in the use of the phrase "one-horse affair," applied to anything contemptibly small. It has never been "the fashion" to "drive" behind one horse, in England or on the continent of Europe, and it is not to this day, although the necessities of city street travel require many one-horse vehicles.

Fast trotters could never be developed until we had a class of influential people of recognized social standing, with whom

it was *fashionable* to drive one horse before a light carriage. That class arose in this country; it does not exist even yet in most other countries. The trotter is so fashionable here that it is difficult for us to appreciate the sentiment in the Old World regarding the use of single horses before private carriages. They are common enough for hire in the cities, and among the common people, the butcher's cart and grocer's wagon has but a single horse there as here, but for private driving among persons of recognized social position, only a span will do. When Lord Brougham devised a one-horse vehicle to carry him to and from the railway station or for his private business about the city, the fact, that a distinguished lord should condescend to drive behind a single horse, caused much and pointed comment. The comic papers ridiculed him, the name "Brougham" was given to the vehicle, and it was long before the gentry took kindly to it.

The trotter is pre-eminently a roadster for light draft. He is the beast to be driven single, and could not be developed until there should arise a fashionable demand for such an animal. His value as a mere horse of use was not enough to lead to the formation of the breed; there had to be some other sentiment than mere use to stimulate the creation of a new breed. As matters were, merely a "good kind of animal" was not enough to create a new breed or even preserve a strain, no matter how useful it was. The Morgan horse of New England has become practically extinct and the Norfolk horse of Old England became nearly so.

The fact, that trotters were unfashionable, was the chief reason why they were not bred. I have carefully read a great amount of old literature relating to horses, and nowhere do I find a good word for trotters in the Old World, if I except perhaps Lawrence, who wrote the last years of the last century. He foresaw their use as roadsters. From time to time they are mentioned as mere roadsters, only valuable for a vehicle.

In most of the old horse literature a trotter is spoken of with disfavor. Fast trotters were, of course, unknown. An

old French ballad "Le lai du Trot" tells us that those ladies who are kind to their husbands in this world may ride on beautiful, ambling palfreys in the next, but those women who are cross and ugly to their husbands here must ride on trotting nags in the life to come; such was the estimation in which trotters were held.

With the American Revolution, a new nation with new social and political sentiments came into existence. In the Old World and during colonial days horse-racing had been, and was still, an aristocratic sport, not to be indulged in by the masses because of its expense, nor by the religious because of its gambling immoralities, nor by the thrifty because of its uncertainties. With New England Puritan, Rhode Island Baptist, New York Dutch, and Pennsylvania Quaker alike, horse-racing long remained unpopular. It was very unthrifty to say the least, if not indeed immoral.

From the traditions of colonial days and the devastations caused by the long war for Independence, it was very natural that a sentiment against horse-racing should be held by the thrifty portion of the citizens of the new republic. As the times grew better after the war and wealth increased, there was a rapidly increasing taste for horse-racing, but the gambling and extravagance incident to it soon led to the passage of laws against it. These attempted the absolute repression of an evil rather than the regulation of a legitimate sport. Before 1820 laws had been passed in all the states north of Maryland forbidding horse-racing in every form, under very severe penalties.

At that time, as well as before, horses were more generally owned by the masses of the people here than in any country of Western Europe. Horses were so common and so abundant that their possession conferred no social distinction whatever. They had, of course, their money value, but they had no more social signification than other property had. One-horse vehicles of one kind or another were in use and were not under the social ban they were in England. What kind of vehicles were used, where they were used, what they were

used for, and who used them, depended upon the roads and convenience. Wealthy people might consider a span more dignified than a single animal, but the use of a single animal to drive was in no way socially degrading. Where it was convenient to use a horse there was no disgrace in driving it single. One-horse vehicles being respectable as well as convenient came to be very widely used by a class who would not have so used them in England. The "one-hoss-shay" of earlier times gave way to the better light wagons, and as the roads gradually became better the light wagons were improved, and finally the buggy was devised. This eminently useful vehicle is a purely American invention, succeeding the ruder light wagon or one-horse wagon. The buggy, a light one-horse wagon, with steel springs, came into use between 1830 and 1840. At the former date buggies were practically unknown, at the latter they were sufficiently common to be no longer regarded with curiosity. They then rapidly came into use and played an essential part in the development of the trotter.

The twenty years preceding this last date marked an era in the breeding of trotters. At its beginning, in 1820, there were no records below three minutes. This was probably about the limit of the natural trot without special training, and was reached by but very few of the very best horses. Alleged performances in three minutes or a little less had been described from time to time, for twenty or thirty years before, as occurring at various places; but the lowest record for a stake or wager was three minutes and there was but one such which still stands as a "record." It was three years after the close of these two decades that the first record was made in two thirty, yet these twenty years were such important ones in the story I am telling that they marked an era in the history of the breed.

It was during that period (1820 to 1840) that speed at the trot as a leading point of excellence came to be especially bred for; trotting became an established sport, tracks for the training and testing of trotters were established under specific

legislative enactments, buggies came into use, and driving fast trotters on the road for pleasure became fashionable. This was the period which marked the beginning of the trotter as a breed, although sentiments in society and blood in horses were preparing for it long before. So let us for a moment look back again.

I have said that trotters were not in favor, but there is a sense in which at times they had friends and were advocated. The trotters of those earlier days were not, however, fast, but animals for slower use. We find occasional allusions to them in English history from time to time from very early dates. In a letter of Margaret Paston to her husband, about 1465, she tells of buying "three horses at Saint Faith's fair, and all be trotters, right fair horses. God save them and be they well kepted." We have frequent glimpses of both trotters and pacers in Norfolk. We have these Norfolk horses especially mentioned as early as 1477, and several pages might be filled with such history. In the attempts to increase the size of the common horses of England, trotting horses are mentioned. A sumptuary law of Henry VIII, sometime before 1540, provided for the raising of trotting horses for the saddle. He started the rearing of heavy horses, the probable progenitors of the England draft-horse of to-day, in fact, he appears to have originated the name shire-horses for them.

During Elizabeth's reign, the production of these heavy animals was further encouraged. Blundevile, in his famous "Fower Chiefest Offices belonging to Horsmanshippe," (1565) says that some "would have a brede of Greate Trottinge Horses, mete for the War and to serve in the Field," but he considered them secondary to the lighter running horses, which were better for a gallant cavalier to ride.

We hear of trotting-horses, pacing-horses, racking-horses, and ambling-horses in Norfolk for more than four hundred years. Small, easy, ambling horses for ladies' use were called hobby-horses down to the latter part of the last century. The Norfolk "trotters" were mentioned by many writers,

and the breed is being revived again and improved, and has now its stud-book.

Towards the last part of the last century trotters everywhere began to attract more attention, and we have numbers of accounts of horses that could trot a mile in about three minutes. There appears to have been a somewhat simultaneous movement in various countries. We hear of it in Italy, France, Germany, and Russia, as well as in the United States. Trotting courses were talked about in both Italy and France, if not actually started, and there were trotting matches in England also. They were not fashionable, however, in any of those countries, and early in this century the interest in trotting declined, and, finally, died out all over Western Europe. It survived only on the estates of Count Orloff in Russia, and in parts of the United States.

Inasmuch as roadsters—"hackneys," as they were called in England—were increasing in importance as the roads were being improved, it is not easy, at this distance in time, to see why the interest in trotting should have so completely died out in Western Europe. I strongly suspect that both the rise and the decline was in some way related to the political events that took place in the fifty years between 1775 and 1825.

But whatever the causes of the decline there, they did not prevail in this country. Trotting stallions were advertised, both here and in England, during the latter part of the last century. An advertisement in the "Connecticut Journal," April 30, 1788, of a stallion called Game Leg at the stable of William Fowler in North Guilford, describes him as being of a bright chestnut color, and "supposed to be the swiftest trotter in Guilford." So far as I know, this is the earliest advertisement of a distinctively trotting stallion in this country. But New England was then, and for many years later, exporting horses to the West Indies, and I notice in the advertisements of the shippers that trotters are often especially asked for.

All of this call for trotters was, however, for horses of

common use and not for fast trotters in the sense used to-day. While there were occasional trotting matches, they were practiced as a sort of rural and plebeian pastime rather than as a fashionable sport. As it rose to the dignity of a sport, it was one suited to the tastes and the means of the masses, for all owned horses, and this was a sport in which even plow horses could take part.

Such was the condition of trotting for the forty or fifty years previous to 1820. In 1806, Volunteer (whose grand-sire was Trotting Jalop) was reputed to have trotted a mile in England in two minutes fifty-eight seconds. An item in the "Connecticut Journal" of June 19 of the same year says that a few days before, the horse Yankey from New Haven, had trotted at the Haarlem course, a mile in 2.59. An English paper in October, 1810, tells of "a chestnut horse from Boston" trotting a mile in 2.58½. The "New York Museum" of July 15, 1815, tells of trotting for sweepstakes at Flatbursh on Long Island. From the number of such items, it is evident that trotting was occasionally indulged in, — sometimes in England, but more often in this country. There were fewer trotters in New England than in the Middle States, although trotters, such as they were, were as much bred, and there are numerous traditions of brushes on the road.

The desirability of having a class of trotting roadsters for light wagons was so widely felt that, as has already been said, they were bred for, unsystematically however, for thirty, forty, or even more years before systematic breeding had materially increased the speed of trotters, it rather favored the production of horses that would trot willingly, and in this country the taste for this gait grew and spread during the very period when it was declining in Europe.

This taste or sentiment naturally led to and stimulated the unregulated trotting alluded to, but this as well as actual racing was specifically under the ban of the law in some of the States and inferentially so over the whole region where the love of trotting was strongest. The desirability of improving the trotting roadsters was so obvious that it was made the

excuse for amending the laws so as to legalize trotting. This was not, at first, the re-instatement of wicked "horse-racing" on "race-courses," but rather, the allowing under suitable restrictions of the more moral "trials of speed" on "tracks" for the training of roadsters. The test of speed could be made with a single horse and a watch even better than with several horses in a "race," and thus records naturally and legitimately came into use.

The state law of New York passed in 1802, forbidding all horse-racing and trotting, was amended in 1821, removing for five years the penalties against horse-racing on certain tracks and under specified conditions, and allowing "the training, pacing, trotting, and running of horses" upon certain regulated courses in Queen's county on Long Island. The act provided that the Sheriff of the county should be present at these "trials of speed" — as the statute calls them — to see that they were conducted decently and in order, and the meetings were allowed only on certain days in May and October. When this amendment expired by limitation, it was re-enacted April 3, 1826, extending the privilege for ten years and until March 30, 1837. Before this expired, another amendment in 1834, allowed "the trials of speed authorized by law in the county of Queen's" to take place at certain other dates than May and October.

The organizations controlling these tracks on Long Island were the beginning of special organizations for the improvement of trotting. Although the legal provisions of these amended laws nominally extended to pacers and running-horses as well, the real object was for trotting.

The New York Trotting Club was organized in 1825 with the aim of "improving the speed of road horses," as the racing clubs and jockey clubs of England had been a century earlier to improve the breed of riding horses, and just as those earlier sporting clubs created a new breed of horses, which became the swiftest runners of the world, so these later ones have created another new breed, which have now become the swiftest trotters in the world. The track of the New York

Trotting Club, near Jamaica on Long Island about a mile from the old Union course, was the first trotting course in America, and probably the first in the world. The Hunting Park Association was formed at Philadelphia in February 1828, and the next year measures were begun for a trotting club at Baltimore, and from this time similar organizations spread rapidly. The "American Turf Register" began in 1829 and recorded the trots, and by 1830 trotting had become an established sport, rapidly increasing in popularity.

There was for a long time a sentiment with many sporting men that trotting was a sort of rustic sport, fit only for the masses, but the fact, that it created such an interest among the masses, was a great gain in the end. In the creation and development of a new breed of horses, it is essential that the interest be sufficiently wide-spread to materially affect the market, and the aim must be sufficiently definite to specialize the points in breeding. The growing popularity of the sport supplied these factors. It was the track, and the gambling incident to it, that supplied the incentive for breeding faster trotters and specialized the point to breed to, rather than for use as roadsters, although this latter was the ostensible reason hung out on the sign, and which appealed to the more moral portion of the public.

During the period I am now more especially discussing (1820 to 1840), trotting became an established sport, legal obstacles for public trotting were removed, organizations for the improvement of trotters came into existence, buggies came into use, trotters driven single became fashionable for pleasure-driving, fast trotters were especially bred, trotting pedigrees began to be studied, the foundations of the breed were laid and the speed greatly improved, although, as yet, no 2.30 horse had appeared on the scene.

By the close of this period, many horses had become well known to the public as trotters, many of the names as plebeian as the sport was held to be. We hear of Betsey Baker, Bowery Boy, Bull Calf, Burster, Ephraim Smooth, Jerry, Jersey Kate, Paul Pry, Rattler, Rob Roy, Sally Miller,

Screwdriver, Top Gallant, Whalebone, and a score of others, now this one to the front and then that. Top Gallant (foaled about 1806) was perhaps the most popular horse of his day. He does not appear to have won much nor often, yet he preserved his popularity for all of that, and his best time, 2.40 (although not a "record," and beaten the same year by the Treadwell Mare), was the slang phrase for speed for thirty years after. He lived to a good old age, as so many trotters have since done, and it was claimed that when nineteen years old he could still trot in 2.45 with a man weighing 150 pounds on his back. In 1832 Burster trotted in 2.32, and then became affectionately known as "Old Buster." Next came Edwin Forrest, who lowered the technical record to 2.31½ on the Centerville course, L. I., May 9, 1834, but even this was a saddle record. This track was too long; if allowance be made for this, the time for an actual mile was nearly a second better; but as it was, it took nine years more to beat it, when Lady Suffolk lowered the harness record to below 2.30.

From that time on all the influences have been at work necessary for the specialization and development of a new breed, and this is the only case among all our domestic animals where we have the exact data all along by which to trace the rate of progress, and to see what the actual improvement has been. This is furnished by the "records" and by recorded times which are not the technical records. The "record" is the time made by the winner in any contest for a purse, premium, prize, stake, or wager on any course and in the presence of a judge or judges. The records of trotting have been preserved with very great care, during the whole development of the breed. Nowadays, the records are those in harness unless otherwise specially stated.

As I have already stated, about three minutes, or a trifle better, I believe to be the ultimate limit of speed in the best trotting-horses without special training, before the creation of special trotting breeds. John Lawrence, a lover of trotters in his day, in his "Practical Treatise on Horses" (1796) says that "the utmost speed of an English trotter (and I have

reason to believe that they excel all others) is a mile in about two minutes fifty-seven seconds." He cites cases where the speed was from this time to three minutes. Previous to 1818 there are many alleged times of three minutes or a little less. That of Yankey has been already alluded to and Shales trotted three times in England in that time. It seems to me that there is abundant evidence that a number of the best trotters had reached that speed, and that, until systematic breeding began for fast trotters, none were essentially faster.

Trotting as a sport may be said to have begun in 1818, when it was still considered a question with most horsemen whether any horse could trot so fast as a mile in three minutes. Frank Forrester tells us that the now famous trot of 1818 grew out of a discussion at a jockey club on that very point. Col. Bond of Maryland doubted if any horse could trot so fast as that, while Maj. Jones, of Long Island, thought otherwise, and it resulted in a bet, in which Col. Bond bet Major Jones \$1,000 that "no horse could be produced that could trot a mile in three minutes." The prevalent sentiment as to possible trotting speed is shown by the statement, that there was much side betting and the odds against the horse were immense. But Boston Blue won and Col. Bond lost the thousand dollars. This trot made much talk at the time, an early account says that this wonderful horse was taken to England and exhibited as an animal which had actually and unquestionably trotted a mile in three minutes. This, notice, was a trot against time, and may be said to be the beginning of technical records. The actual development of the breed may be shown from the records in two ways, — first, by a table showing the successive lowering of the best records; and second, by a table giving the actual numbers of horses with the several records below that made by trotters before this improvement had begun. The following table shows the best times down to 1840, and the best harness records after that. Previous to the date mentioned, all of the best records were under saddle; and there were many well authenticated times observed that would now be ruled out as technical records. Latterly, all

the best times are records in harness. For the purpose of showing the actual increase in speed, it is fairer to use the best authenticated times for the progress during the earlier period and until we had 2.30 trotters. I have, therefore, in the following table included in the earlier parts authenticated times and saddle records; but since 1840 only technical records in harness, although Lady Suffolk trotted in harness in 2.26½ in 1843 and Tacony in 2.26 in 1852, both of which were better than the best saddle records at those dates.

Table of increasing Speed.

1818.	Boston Blue	.	.	.	.	.	.	3.00
1821.	Top-Gallant	.	.	.	.	.	.	2.43
1824.	Top-Gallant	.	.	.	.	.	.	2.40
1824.	The Treadwell Mare	.	.	.	.	.	.	2.34
1830.	Burster	.	.	.	.	.	.	2.32
1834.	Edwin Forest	.	.	.	.	.	.	2.31½
1845.	Lady Suffolk	.	.	.	.	.	.	2.29½
1849.	Pelham	.	.	.	.	.	.	2.28
1853.	Highland Maid	.	.	.	.	.	.	2.27
1856.	Flora Temple	.	.	.	.	.	.	2.24½
1859.	Flora Temple	.	.	.	.	.	.	2.23½
1859.	Flora Temple	.	.	.	.	.	.	2.22
1859.	Flora Temple	.	.	.	.	.	.	2.21½
1859.	Flora Temple	.	.	.	.	.	.	2.19¾
1865.	Dexter	.	.	.	.	.	.	2.18¼
1867.	Dexter	.	.	.	.	.	.	2.17¼
1871.	Goldsmith Maid	.	.	.	.	.	.	2.17
1872.	Goldsmith Maid	.	.	.	.	.	.	2.16¾
1874.	Goldsmith Maid	.	.	.	.	.	.	2.15½
1874.	Goldsmith Maid	.	.	.	.	.	.	2.14¾
1874.	Goldsmith Maid	.	.	.	.	.	.	2.14
1878.	Rarus	.	.	.	.	.	.	2.13¼
1879.	St. Julien	.	.	.	.	.	.	2.12¾
1880.	St. Julien	.	.	.	.	.	.	2.11¾
1880.	St. Julien	.	.	.	.	.	.	2.11¼
1880.	Maud S.	.	.	.	.	.	.	2.10¾
1881.	Maud S.	.	.	.	.	.	.	2.10½

1881.	Maud S.	.	.	.	.	.	.	.	2.10 $\frac{1}{4}$
1884.	Jay Eye See	.	.	.	.	.	.	.	2.10
1884.	Maud S.	.	.	.	.	.	.	.	2.09 $\frac{3}{4}$
1884.	Maud S.	.	.	.	.	.	.	.	2.09 $\frac{1}{4}$
1885.	Maud S.	.	.	.	.	.	.	.	2.08 $\frac{3}{4}$

With much labor I prepared and published seven years ago a table giving the number of horses having the various records below 2.30. The labor of its preparation was so great and the figures have since so enormously increased, that I have not kept up the table to date. I will here only use some of the figures which, taken in connection with the above table, will enhance its significance. This table is very significant and however studied is most instructive. I can here call your attention to only a few of its suggestions.

If we consider the gain by decades beginning with 1818, we find in the first decade, ending with 1828, the time was reduced 26 seconds. This great gain in such a short time, while the previous twenty or twenty-five years had shown none at all, was doubtless due mostly to the better training and preparation of trotters, although partly to the much larger number trotting, and possibly a little to breeding for this gait.

During the next decade, ending with 1838, the speed was increased only two and a half seconds. Mere training had nearly expended its effect in the previous decade, and heredity through a trotting pedigree had not yet time to show any considerable results. No horse reached the 2.30 class, even under saddle for five years later, and not in harness, until seven years later.

During the next decade, ending in 1848, it was lowered but two seconds (4, counting Tacony's time under saddle). We have now a 2.30 class with two or three horses in it, and several others who had made that time under saddle or as parts of longer races.

During the next decade, ending with 1858, the record was lowered five seconds, trotting blood was beginning to tell, and at its close there were about thirty horses in the 2.30

class, not quite so many with this technical record, but over thirty who had made that actual time.

Ten years later, 1868, the record had dropped seven and a fourth seconds farther. When Flora Temple trotted in less than 2.20, many considered that the limit of speed at trot had been reached. More than one writer, even in the sporting periodicals, considered her a freak of nature, an abnormal production which might never occur again, rather than the logical result of intelligent breeding with a specific aim. Before this decade closed, the best record was 2.17 $\frac{1}{4}$, there were already two or three horses in the 2.20 class, and 146 in the 2.30 class.

The next decade, ending in 1878 lowered the record 4 seconds more, and over a thousand horses had trotted in 2.30 or better.

The next ten years lowered it four and a half seconds more, and the 2.30 list then numbered 3,255 horses. At the close of last year, 1890, there were 4,613 horses in the 2.30 list, 382 in the 2.20 list, and two in the 2.10 list.

When we contemplate these figures, the query immediately suggests itself, how fast will horses ultimately trot, and how long will it be before they reach their limit. It is a fascinating subject to speculate on and many have ventured opinions on the matter. It is at best but a guess, although each guesser uses arguments to fortify his opinion; and the conclusions differ all the way from, that the limit is already reached, to the inference, that horses will ultimately trot as fast as they now run.

Some prominent writers and breeders think that the better trotters of to-day have practically reached the limit, and that further improvement will simply result in placing a larger number of horses in the 2.10 or 2.12 class. These persons believe that the two minute trotter is a practical impossibility. My own belief is, that a two minute record will be reached, that many horses will be bred that will trot faster than our best record of to-day, that the limit will not be reached for half a century yet and not until we have a breed in which the

instinctive fast gait is the trot, as the run is now the instinctive fast gait of the thoroughbred. When after breeding from successive generations of "winning sires" of trotters, with corresponding dams; when the foal trots as instinctively as the thoroughbred now runs; and when the conformation of the animal as completely sustains these instincts as that of the thoroughbred does his, — then we will have many horses in the 2.10 list, and the two minute trotter will be among them. Some enthusiasts believe that the trot will finally be as swift as the run. This I doubt.

Let us notice some more of the lessons the history of the trotter teaches, and which have a general application. The breed had its origin in a mixture of various breeds and of mongrel blood. In all practical breeding two biological forces, heredity and variation, always go along together. Heredity tends to keep the coming generations like the past: variation tends to make them differ. Variation is the uncertain factor in breeding, and yet without it there could be no improvement. It is well known among breeders that the more varied the ancestry, the more varied and variable the descendants. Hence the uncertainty in breeding from mongrels. The original stock from which the trotter was created, the raw material out of which the breed has been made, was a very varied and mixed one, inducing much variation and thus giving the breeder abundant material for skilful selection. The English thoroughbred, the Arabian, the Barb, the Narragansett pacer, the French draft through the Canadian, and the mongrel native stock originating from various unknown importations have all contributed to his blood. From the better animals produced out of this heterogeneous mixture, the trotter has been developed by careful selection and skilful breeding. The variation in the direction of better trotting, whether the instinct to trot or the conformation to produce speed, was taken advantage of; the characters enhanced by selection, and fixed by heredity and pedigree.

I will say in this connection that I think the blood of the pacer in the trotter has been very important and has operated

in two ways. First, it was good blood, some of it derived from the old Spanish stock, it is said. Second, the natural instinct to run had been more thoroughly broken up in the pacer than in any other kind of horses. Pacing was considered an artificial gait acquired through careful training, which after generations of such special training became more or less instinctive, "natural pacers" being the result. This blood increased the disturbance in the natural instincts, and aided in the variation through which a new instinct was produced. Some writers grow merry over the "trotting instinct" and say that there is no value in it, some even deny that it exists at all. Such denial becomes a mere play upon words, for no one can deny that there are now "natural trotters," and that trotting was not originally a fast gait for any breed of horses.

Pardon this digression, the next suggestion is, that the best material should be used as the foundation to improve upon, whether it is to be used as the foundation of a new breed or of merely a new flock or herd. The most skilful breeder cannot reach as good results from an inferior breed as he can from one of naturally greater excellence. I have often thought that had that great breeder, Bakewell, chosen short-horns to begin with instead of long-horns, the history of improved cattle would have been very different from what it has been, and short-horns would have come into fame and eminence a generation earlier than they did. Although not acquainted with the long-horn breed, yet I have watched its career with great interest. It had the start in time, and in the hands of skilful breeders it has fought for a high place; but has been unable to keep up in the competition with the short-horn breed, which was better to begin with and soon distanced its older rival. Now, after a struggle of more than a century since Bakewell took hold of the breed, it is farther behind in the competition than it was seventy years ago, and must, as a consequence, in time disappear as a competitor in the general markets.

The trotter was created out of a mixture of various blood but

it was all of it, so far as we know, good blood to begin with, and no further ingredient should now be introduced, unless of the very best. Personally, I do not believe that any considerable further addition of thoroughbred blood is advisable to increase the speed, but I do believe that certain strains of Arab blood may be used with great advantage to increase the value rather than the speed. A prominent New York breeder, Mr. Randolph Huntington, is still using Arabian blood as an element for the production of serviceable animals with much success. I think that, if enough other breeders would think with him, a desirable improvement would be the result. As it is, I expect to see a fleet, beautiful, and serviceable strain of trotters originate from that breeding.

Breeding trotters as an implement of gambling may be objected to by some. All fast trotters are not used for the track, yet it has been the gambling incentive that has made the breed what it is. This incentive has stimulated an enthusiasm which mere sober and practical use never could supply, and has determined the specific points to breed for. It has furnished the incentive to training, has enhanced prices, and has been an essential factor in the practical problem. I will not here discuss the gambling phase, further than to use the practical fact, that it has enormously enhanced the market values of fast trotters and has brought the useful character of all trotters more conspicuously before the public. Over a hundred thousand dollars were paid last year for the trotting stallion, Axtel, and there has been much speculation as to whether as large a sum would ever again be paid for a trotting stallion. Why should it not? If trotting remains the fashionable sport it now is, a stallion as a "winning sire" may justify such prices as a simple investment. Such possible inducements and possible prices for very fast trotters for use as implements of gambling, have been an essential factor in making the American trotter what it is, and will continue to be a factor in the development of the fastest members of the breed. That some trotters are used as implements of gambling is no more an argument against breeding them, than it would be to discourage

the growing of wheat, pork, or cotton because of the gambling of the produce exchange.

While similar incentives do not exist in breeding the useful kinds of other live stock, the breeders can nevertheless profit by the lessons the breeding of racers and trotters teaches and the principles they illustrate. It shows what can be done if sufficient care and thought be used.

In the revival of agriculture in New England, which I believe to be at hand, I think that horse breeding for city markets will again revive. There is now and will continue to be a steady market right at home for the many kinds of serviceable horses needed in cities. For most of these uses some trotting blood is an element with a money value. "Trotting is the gait of traction" has often been enunciated, the gait for a vast multitude of city uses. It is useful alike in the plodding car-horse, the lively horse for the grocer, the gentleman's stylish buggy-horse, the uncertain but useful hack-horse, and the sleek family horse. There is an increasing demand now for heavier, more sober, dignified, and less nervous horses for the family carriage, and this demand is sure to continue. For this, trotting blood crossed on some of the heavier and slower draft breeds is eminently suited both in form and disposition.

Again, horses bred on the dry hills of New England are believed to stand the wear of city streets better than those from the softer soil of the more level West. Personally I have no doubt but that this is a fact. I have questioned many liverymen and horse-car men in our Eastern cities on this very matter, and their opinion is well nigh unanimous. They tell me that Western horses are used because they are cheaper and are abundant, and because New England horses are not to be had. They say that the feet of the Western horses are not so good.

In conclusion, the great lesson I wish to inculcate is this: that hereafter, New England farmers must, as a class, pay more attention to the breeding than they lately have, and that they cannot afford to breed the poorer sorts of animals. I

believe that she can better compete with the West in horse breeding than in cattle. Sheep seem doomed by the dogs living in the manufacturing villages, but horses can be produced here again, as they formerly were, and trotting blood is a valuable kind to consider.

The horse of old was the horse of the warrior or the horse of the rich, his use and possession confined to the favored classes. The trotter originated among the masses as soon as the people were free. He developed for use rather than for luxury, he is the horse for business as well as for pleasure, the horse for the bustle of the busy street as well as for the quiet country road. The horse of old was the horse of war and waste; the trotter is the horse of peace and thrift, the last and most useful breed of his species, developed to meet the needs of our modern and higher civilization.

Adjournment was made until 10 o'clock A. M., Thursday.

THURSDAY, February 12.

The morning session was called to order by the president as follows:

THE PRESIDENT: We commence at this time the programme of the second day. I was in hopes that I might see many more present. Still, what few are here are entitled to the best talent we have present with us. The subject this morning is one which will be of interest to all dairymen, and it is to be presented by Mr. Connor, president of the State Dairymen's Association. This association has been of great help to us in our work. In fact, their work is in line with ours as well as that of the Grange, and we are all working together in harmony.

I now introduce to you President Connor of the Dairymen's Association.

DAIRYING.

BY J. M. CONNOR, HOPKINTON.

It is assigned to me to speak upon this subject, as representing the dairy industry. When informed by the secretary of

the Board of Agriculture that I was expected to do so, my first thought was, that this theme was getting a little threadbare ; but upon further reflection, I saw that the most advanced dairymen in our State never were more eager to advance, never more desirous for light upon this great industry, than to-day.

I wish it were in my power to lead them up to a higher position than they now occupy. But if by any means I can be instrumental in spurring up the great army that constitute the rear guard in this industry, I shall feel that some good is accomplished.

While excelsior should ever be the motto of all, yet we feel a reasonable satisfaction in the advance made by a large number of the pioneer workers in our State in this advancing industry. All honor to the noble band of workers who have led the column in the grand march that has signalized such victories for a higher grade of dairying in the old Granite State for the past ten years. Still there are a multitude of farmers in this State, as well as elsewhere who are bound to their idols, and the one they worship most is the idol of self conceit.

In all the trades and professions, none manifest so little desire for mutual consultation and helpfulness as the farmer. He, of all others, thinks he knows it all. But it is an indisputable fact, that no occupation or industry requires more research, or in which greater advantage can be gained by mutual consultation than in the pursuits of agriculture. Many who are inclined to cast reproach upon rural pursuits because of its backward condition and lack of uniformity in production, too often forget the peculiar relation this industry bears to all other pursuits.

The massing together of all the smaller industries under the power of concentrated capital, employing armies of workmen under skilled directors, cannot fail to produce uniformity of results, and to cheapen production. But when we come to the industry we represent here, to-day, there will ever be obstacles in the way of perfecting such a system of control and concentration of effort.

We are yet unable to reap the benefits of combined effort and capital, excepting in the single instance of the establishment of creameries, and here it can only partially be perfected. Breeding, and feeding, and much of the work in its first stages must ever remain to individual care.

If you desire to improve our system of railroading, if any suggestion could be offered to elevate manufacturing or any mechanical pursuits, you have only to go to a superintendent or a half dozen directors, not to the multitude of shareholders who have surrendered all control.

Not so in farming, in dairying; here every tiller of the soil stamps upon his production the condition of his own advancement. His trademark is a reflection of the progress he is making in the line of his industry. Dairying is more affected by this condition of things than any other farm specialty. There are more conditions affecting it, more mystery running through every minute detail, from the breeding of the delicate and wonderfully constructed cow, to the last touch put upon her golden product which enters into such universal consumption.

We have abundant reason for congratulation, that New Hampshire farmers have made such rapid improvement in dairy knowledge within the past ten years. Every coöperative creamery in the State, now numbering about forty, has sprung into existence within this period. The principles of breeding and feeding, and all lines of dairy work, are far better understood now than ten years ago. But are we satisfied to rest with our present attainments? Rather, are we not ashamed that, with all the light there is abroad, we are compelled to confess that the larger part of our farmers are plodding along, using methods wholly unprofitable? That a large proportion of the cows kept in this State, do not return their owners a living profit? There are many agencies working against the farmer, and he has reason to complain in some measure that he is not getting a fair return for his labor. But this will never excuse him for neglecting to put thought and energy into his business.

We may mourn over our deserted farms and speculate as to the causes, but let us look the matter squarely in the face and call things by their right names. What has led to this condition of things, and what is working to-day to produce the same results, is nothing short of sheer mismanagement, deserted brain power, a shiftless, whimpering desire to get something out of nothing, a self conceit that will seek no advice from superiors. What we need to-day, most of all, is that farmers themselves shall give no quarter to that class of their fellow farmers whose methods and practices are such as must inevitably lead to deserted farms, abandoned homes, forsaken churches and schools, and a disgraced industry. If we would place this noble, God-ordained calling, this fountain source of all wealth and prosperity, on the high position it ought ever to occupy, we must not ignore the fact, that no class of people are doing more to trail our banner in the dust than those of our own calling.

I may be digressing from my subject, but what is true of farming as a whole, is equally, and with greater force, true of the dairy industry.

Those who are striving intelligently to grade up their dairy stock; who as the years go by are increasing their annual products per cow—and quality as well; who are adopting every device to save labor and improve quality; who read, think, and investigate, are not ashamed to consult their superiors. Such men will abide on the old homestead. Their names will not be found on the long roll of dishonor, published by the honorable commissioner of immigration. These are the men who “make two blades of grass to grow where one grew before,” two pounds of butter to be produced now by the fine bred Guersey or Jersey of to-day where but one was obtained by the hap-hazard, ill-bred scrub of the past.

There is one thought that impresses me as worthy of more consideration than it receives, which is the lack of definite purpose too common among farmers. The lines are being drawn closer and closer in every profession and industry. Men are wanted to-day only for a special line of duty; and no man

can succeed whose mind is constantly reverting from one line of work to another. The farmer cannot make himself an exception to this rule. No one man is big enough to comprehend and make a success of all branches of farming at one and the same time.

Enquire of almost every farmer you meet, why he does not give more attention to dairy matters, why not secure the services of better breeding animals, have more of the improved apparatus for his dairy work; and he will tell you that he is not doing enough in that line to make it pay to be to the expense, that he has no fixed purpose, that he is undecided as to what line of farming pays best. He formerly went into sheep raising, and that went down; then young cattle and beef, and that failed of remuneration; that he is half inclined to go into raising horses, but it has always been his luck, by the time he got fairly under way, the horse market would become glutted; and it would be so with dairying if he should go into it,—so he has come to the conclusion to have as many baskets as he has eggs, then he would not break but one at a time as he blunders about in the dark. Such a line of policy has caused more deserted farms, driven more young men off the old homestead, done more to depopulate our rural towns, than everything else combined. It is the broad road to destruction, broad because it is too broad for any one man to comprehend.

Dairying is objected to by many because it involves too much labor, and competent help cannot be obtained to conduct it. Too many are in the condition of the farmer alluded to above. They have been floundering about with no especial conveniences for anything.

In the modern creamery, everything is so arranged in point of convenience, that one or two men will accomplish a great amount of work. So, in the private dairy, proper utensils, convenient rooms with reference to both summer and winter work, right appliances for controlling temperature at both seasons, has much to do in determining the amount of labor, and very much to do with the quality of goods manufactured.

After years of labor and investigation, and from a practical standpoint, we have no hesitation in saying that the cow and the pig, if rightly handled and made use of, will bring prosperity to the farmers of our State. The sale of their products carries little of the fertilizing elements off the farm, while the nature of the food which they require—which should be abundant and of the best quality—will fertilize our lands and increase their productive capacity. It is possible, yea, it is easily within the power of the farmers of New Hampshire, to increase the present product of our cows one hundred pounds each within the next ten years, and to double our pork product.

Our best dairies already exceed this increase, and what a few in every town are doing is easily within the reach of every one, if they will follow the example of the noble patterns that are scattered all up and down our State. Shame upon the man, be he farmer or otherwise, who will not submit himself to be taught by his superiors, when such teachings are in the line of his advancement and material prosperity; and equally discreditable it is in him who will not freely impart to his fellow farmer any knowledge which he possesses, that will raise such a one in the scale of his labors, and thus, by mutual helpfulness, elevate to a higher position of manhood and womanhood.

True it is, the breeding of superior animals, all the nicer points that enter into the compounding of her food, just how to develop all the nicer points in butter and cheese making, will be points for discussion and speculation. But no one need think that because of this, the task is a hopeless one. Discarding all nice distinctions, and in the light of plain matter of fact, who cannot breed up a cow, that without forcing—only by fair and liberal feeding—will produce from 225 to 275 pounds of butter yearly? We will take the medium product, 250 pounds, as the basis for our reckoning, this at 25 cents per pound—and this is no extravagant figure—we have \$62.50; \$12.50 for her calf and the value of the by-product for pig feeding—only a moderate estimate—and we

have a round \$75 as her yearly gross income. Who will not say that this is a reasonable statement and a satisfactory profit.

But what sort of a showing do the majority of the cows kept, in this State or any other, make from their present product? According to the report of the dairy commissioner of the great dairy State of New York—a State that has a capital invested in the dairying business of over \$350,000,000, with upward of \$1,500,000 cows, from a careful personal inspection in 1,284 butter and cheese factories—he found the average amount of milk produced per cow to be 3,034 pounds. These were the figures from which the patrons of the factories derived their income. He found also from these estimates, the average income from the cows to be less than \$35 a year.

Take the great dairy State of Wisconsin, the home of some of the foremost dairy lights of this country. The average cow in Wisconsin produces about 115 pounds annually. From the last annual report of her dairy commissioner, I learn some astonishing facts. The commissioner made an analysis of the milk of over 400 different herds, and out of this number only five herds analyzed five per cent of butter fat; while the milk of my own herd was analyzed at the late annual meeting of our Dairymen's Association and tested five and one half per cent of butter fat.

I draw this comparison between our condition and that of two leading dairy States in this country. New Hampshire has made far more rapid advancement in dairying the past ten years, than either of these large dairy States. We have not their broad acres, nor their great herds; but we have peculiar soil and climate, we have people whose habits and customs are different from theirs, a people, who, for mechanical skill and power of research, can beat the world. No State is better equipped for the discussion of dairy topics. With a Grange in over half the towns in the State; its Dairymen's Association, which will soon reach every county in the State; its Board of Agriculture, holding upwards of twenty institutes in all parts of our domain; its Experiment Station, amply furnished for scien-

tific investigations; with an agricultural press second to no other State of its size,—surely, when all these forces are at work with a will and a determination, who can dare predict what a power there is in such a force! No dilly-dally policy, no hesitating, doubting, Thomases can succeed in this industry. It must be put on a business basis. We are manufacturers and must know the power and quality of the machine we are running; we must know the power and quality of the feed these machines consume. We must test their capacity. We must discard every machine that does not come up to a certain standard of work.

What are the qualifications required of an engineer? They are very exacting. “Many are called but few are chosen.”

But to run this machine we call a cow requires as much more knowledge than to run an engine, as the latter requires more than to run a wheelbarrow. The engine is an exhibition of man’s imperfect works. The cow is the handiwork of an all-wise Creator.

MR. PHILBRICK, Vice-President: In the absence of the president it devolves upon me to assume his duties or try to do so as well as I can. I am going to call upon Professor Brewer to make a few remarks on this subject, as the hour has not expired.

PROF. BREWER: As Mr. Connor was speaking, two or three thoughts came into my mind.

There is one point which I do not think is sufficiently taken into account in any discussion of agricultural matters. There is no question but what farmers are more independent than any other men. They are more independent mentally than any other class of men, and it comes very largely from the fact, that they work alone and carry on different kinds of work that require the exercise of personal judgment. You take a lot of men at work in a factory of some kind with foremen or bosses to lay out their work, and then the most of that done by machinery, it does not make much difference whether those men have any brains or not. They work in a crowd,

they keep in a crowd, to the loss of personal independence that exists among working-men in other avocations. The farmer works alone, or if not alone only two or three together, and his work calls continually on the exercise of independent judgment from the littlest to the biggest, from the simplest to the most complicated, operation. In everything that he does there is something that continually requires of him personal thought and personal judgment, and that cannot go on with any man, I care not what his avocation is, without educating him.

Farmers may not be quick to adopt new impressions, but when they take hold of them they take hold of them in earnest. Farming, as I have said before, gives them an independent judgment and it is of very great value when you get them started right.

Now a word regarding the dairy business in this State, and the State does not stand alone in the conditions which exist. In Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, and to a lesser extent in Maine, perhaps, there is a continual increase of the population in the towns, which continually improves the local markets for dairy products. My own belief is that the dairy business will continue to increase in those states, and that opinion is founded on several reasons. The first reason, and the one of the greatest importance perhaps, is that they can produce an exceedingly good product. I think, the world over, a hilly region will produce better butter than the level region, no matter how fertile the latter may be. I think, if you will look the matter over, you will find it is the hilly region that is noted for its butter and cheese, I say hilly region in distinction from the great flat and level portion of the country; then too, there is the upland region, of which there is so much in New England, as distinguished from the lowland region, and that is a factor in the production of a good product. Look how Switzerland was noted, and is still, for its dairy products—its butter and its cheese, and its milk also. The first time that I was ever in New Hampshire it struck me that there ought to be a good

quality of milk in this State, and I stopped at a farm house and asked for a drink of milk. I did it in order to test the milk so far as it could be tested by the tasting. I was not disappointed in the result. I do not believe that the level prairies of the West will ever be able to produce quite so nice an article as can be produced in this State and in the neighboring States. I do not pretend to say what the reason is, but there is certainly a peculiar flavor and texture which they cannot quite equal. Some years ago, I recollect there was some butter shown at an exhibit, which was remarkable for its flavor. It was examined by Mr. Arner and he asked the maker: "Was this butter made on upland or lowland?" "On lowland," says the farmer. "Are you sure?" "Yes, I know it." The farmer was one whom Mr. Arner knew and he placed confidence in his statements. Finally he said, "It is the best butter I have ever seen made from the lowland. If I didn't know you and your reputation, I should think there was something wrong about the statement." The farmer remarked: "Well, I guess we misunderstand each other. What do you mean by lowland? There is a swale that runs through my farm, although the farm itself is one thousand and fifty feet above the place where we are talking. It is an old pasture and the ground has not been plowed for a good many years. I keep it for the cows in the summer season and they run in there." "That is just what I wanted to find out," replied the expert. "Now that was a hilly region and the pasture was an old one, and then combined with that, of course, the butter was well made.

There is a good deal of discussion regarding the part of the experiment station in dairy matters. There is no question but what the experiment station will be of great advantage to the dairy interests, but it will be almost entirely in the direction of increasing its product rather than the quality of the product. The quality of butter produced depends so much upon the butter maker. Supposing he has good cows and good pasture. Begin with that and the quality of the butter for the rest depends upon the way it is made. Science has not taught

us to make any better iron or steel than our ancestors could make. There is not a factory to-day that can make any better steel than that which was made out of the ore by hand forging. No steel now is any better than the old steel which used to be beaten into Damascus blades with hard work and great labor. There is now no iron any better than the wrought iron made out of the ore by hand forges. Science has taught man how to make large quantities of steel and iron at a minimum price. Steel used to be a pretty dear material. It cost, I don't know how much a ton. Now they make fair steel in sufficient abundance and cheap enough to make railroad rails, and our railroad rails are largely made of steel. But the steel is of no better quality than it used to be. So, it seems to me, it will be in the dairy business. Science will teach us how to make butter cheaper and in larger quantities but not of a better quality.

As Mr. Connor was speaking in regard to the matter of difference in cows, I thought I should like to say something on that point. The difference in cows that will give you five and one half per cent of butter fat and those that will give you but five per cent is enormous. There are very few manufacturing corporations that run on so wide a margin. What is the difference between five, and five and a half per cent? As applied to the percentage of butter fat in milk, it makes a big difference—two or three times the difference between positive loss and positive fortune. Among our great manufacturing corporations the great question is, how the product can be cheapened, or, what is the same thing, how can we get more product for the same amount of labor. Inventions are called in, engines are improved so that they may give you the largest amount of power with the least expenditure of coal, and so on through all the various kinds of machinery. If one man gets ahead faster than another, it is because he looks after the matter of economy in production more than the other. The great benefit of the sciences and the arts has been, after all, in that direction. While science has added many new things to our store of knowledge; while it has gone a

great ways to increase our comfort in a manner never dreamed of before, — after all, its great work has been to improve the old processes and cheapen production of things like iron and steel. I allude to that, because that is something that you are all familiar with. It is one of the objects of the experiment stations to determine the relation which exists between feeding and the milk, in order that the farmers may take advantage of that relation. When they show that a cow may be made to give milk containing five and one half per cent of butter fat instead of five per cent, then the farmer will be placed in a great deal better position. It is in that direction that you are to expect the most benefit from experiment stations and scientific work.

I have not as much faith as a great many have in the advantage of the agricultural schools in attracting the boys to work on the farm. I have great faith in the indirect influence of the experiment station and the knowledge derived from it, in the form I have suggested. Only a few boys among the many can go to the agricultural school to be educated for farm work, but every farmer, from the poorest to the best, can be benefited in the direction I have already spoken of. It is not probable that the time will ever come when we can make our millions from cows, even though they may be of the best herds. Nevertheless, the increase in product that may be brought about without a corresponding increase in the expense is very great. And it behooves enterprising farmers to keep in mind the difference between five per cent and five and one half per cent of butter in milk. It is more than twelve per cent on the total product.

So, too, in price. I was once at a cheese convention in which the wail was, at that particular time, the price of cheese. A, B, C, and D were discussing how little they could get for cheese. One man got up and said how much he got for his cheese. He looked like a good, substantial farmer. I believe he made his own cheese. Somebody got up and was going to squelch him by the question, "How much do you get for your cheese?" He gave a price which was

twice and a half the average price. He didn't, however, spend twice and a half as much work upon it or anything like it. He had made cheese for years, and had obtained this fair price for all he could produce, right along. He did not look as though he was worrying over the price of cheese, not a bit of it. His only wish was that he had a little more of it to sell (Laughter). If you strive in the direction of a better article, you will increase the price of the butter whose quality is thus enhanced more than you do the labor that you put upon it. I believe that can be done.

THE VICE-PRESIDENT: There are many others that I see before me whom I should like to call upon to continue this discussion, but the hour dedicated to this subject has expired. We have with us a member of the Massachusetts State Board of Agriculture who stands at the head of market gardeners in New England. A man who started with his two hands and has worked himself up until he is one of the leading lights in market gardening. It now gives me pleasure to introduce to you Mr. W. W. Rawson of Boston, who will now address you.

MARKET GARDENING UNDER GLASS.

BY W. W. RAWSON, ARLINGTON, MASS.

In presenting this subject I shall speak from my own practical experience for the past twenty-five years. It has been my constant study, and I have obtained better results and more satisfaction from the cultivation under glass than from the open field. After understanding the nature of the plants it is a very easy matter to grow them under glass where all conditions of the atmosphere can be controlled, which is done by using steam or hot water for heating and water for irrigation.

Plants require light, air, heat, and moisture: and like Faith, Hope, and Charity, the greatest of which is Charity, so the greatest of these is moisture. The light is supplied by the sun, moon, and by the electric light; air, by ventilation in

different ways, according to the situation; heat, by steam, hot water, or by hot manure placed under the plants; and moisture, by irrigation supplied by either wind-mill or steam pump, but the steam pump is the only one to depend upon where large quantities are required. When houses are heated by steam a pump can be run very easily at a very small expense by placing one by the side of the boiler, and taking the water from a well or stream, if the distance is not over twenty feet. The water can be pumped into tanks and warmed to any temperature required before putting it on the plants; or if in the spring or summer it can be put on the plants direct from the pump. Both ways are arranged for where much water is required. In many cases in the winter season very little is necessary, and a tank of three or four thousand gallons capacity being on hand at any time the pump will have to be used only when the tank gets empty, which may be once a week. But in the spring and summer time it will need to be used nearly every day. I know it is very expensive to fit up an arrangement of this kind, but the benefit derived soon pays for the outlay, and it is better where required at all to have a good sized pump and no pipes less than two inches in size.

There are quite a variety of vegetables grown under glass at the present time, among which are asparagus, lettuce, cucumbers, radishes, beets, rhubarb, parsley, spearmint, tomatoes, cauliflowers, melons, and carrots.

Asparagus can be grown under glass by placing the roots thickly in a bed in the field and placing the glass on the bed, having the plank put down in the fall and a heavy coat of manure put inside the bed, so as to allow the ground to freeze but very little. The glass should be placed on the bed early in March, cutting can commence in April, and by the time out-door asparagus comes on the grass crop will be done. Then the bed should be allowed to grow up to seed and be prepared again another year the same way. To grow in hot houses the roots should be dug in the fall, placed in a cool cellar, and put into the houses early in the winter. In

four weeks after the roots are placed in the house, cutting will commence. After cutting for six weeks, the roots are taken out and are of no further use.

Lettuce is grown very largely in the market gardens all the year round, but nine months of this time it is grown under glass. It requires constant care. Two transplantings are required, as it will head better where two transplantings are made than it will if only one is made. The seed sown September 1 will mature for market early in November; that sown October 1 will mature the last of December; that sown November 1 will mature February 1 to March 1; that sown January 1 will mature in March; that sown February 1 will mature in April. It takes, on an average, about three months to grow a crop, but more time is required in the short days of December and January. This can be partially overcome by the use of the electric light, which by a trial of mine, increased its growth fifteen per cent while it increased its quality ten per cent, so that the increase in time and quality equaled twenty-five per cent. The temperature required for the growth of lettuce is from 40 to 60 degrees, and this is the temperature of the month of May, which is the time of year that lettuce grows to the greatest perfection. The headed variety is the kind mostly grown in New England; the White Seed Tennisball is the variety grown under glass, and the Black Seed variety is used for field culture. The lettuce crop is the most valuable one grown by market gardeners, and it requires many years of experience to grow it to perfection. It is sold by the dozen, or by the barrel-box or barrel at wholesale. There are large quantities sent to New York by growers around Boston. The growing of lettuce in the winter is quite a business in that locality. The lettuce is transplanted the first time three and one-half inches apart, either in the house or hot-bed, and after four or five weeks is again transplanted to seven inches apart, where it is allowed to mature. It is necessary in the hot-bed to have the heat supplied from under the loam. This is done by putting hot stable manure about twelve inches deep in the bed which

has been prepared for the purpose. Then put on the manure about eight inches of loam worked very fine before putting in the plants. Very little manure, if any, is needed for the plants, but some should be added to head the lettuce. The plants can be grown much easier in the houses than in the beds; and when understood lettuce can be headed better and easier in houses, but to those inexperienced the heading under sash will be the most satisfactory. Some years ago it was considered that lettuce must bring \$1.00 per dozen to be profitable, but now it can be grown at a profit for fifty cents per dozen, and much better lettuce at that. Some may ask: How much manure does it require to grow a crop of lettuce? When the heat is supplied by fresh stable manure it takes one foot, cord measure, for every hot-bed sash or one cord for eight sash, so that nearly all the coarse manure teamed in winter by market gardeners is used in their hot-beds. After the crop of lettuce is off, another one is put into the same house or a crop of cucumbers is put in. But to make the most of the houses three crops of lettuce are grown and one crop of cucumbers. The cucumbers being the last crop are generally started by the first of February, set out in the house the middle of March, and full grown cucumbers can be picked in four weeks after the last transplanting. The cucumbers are sown in a warm bed or in a box kept in a very warm place, at a temperature of 80 to 90 degrees. After the plants are up, say two days, transplant them into hills, four plants in each, where they may be kept at a temperature of 70 degrees until put into the house in hills two feet apart in the row, and two rows in a house twenty-four feet wide.

When the vines begin to run, they should be tied up on a frame made of narrow strips of board one way and laths or wire the other. The vines will soon cover the trellis and the blossoms will appear. These should be fertilized by bees, which may be put into the house as soon as the blossoms appear. This must be done or the process may be done by hand, but it takes one of experience to do this and it is not often practiced. The cucumbers can be picked in two weeks

from the blow and can easily be seen hanging down on the trellis. After the cucumbers are done bearing, the houses can be cleaned out and again prepared for lettuce in the fall. The cucumbers generally last until about the middle of July. The glass on the hot-beds, after having been used for one or two crops of lettuce, a crop of radishes, carrots, or beets, can then be used for cucumbers by putting down two rows of plank the proper distance apart and by digging a trench two feet deep and two feet wide, putting in one foot in depth of hot stable manure. After the ground becomes warm, set the cucumbers on the hot manure or over it, and keep the temperature above sixty degrees; they will grow to maturity in about six weeks, the plants having been prepared previously in hills as described for the houses. The glass must remain on the beds until July 1, being raised every day. The bees do not have to be put into the beds, as they go in of their own accord when the glass is raised; or the cucumbers may be fertilized by the wind, as they are in the open field. I will not speak of the amount of cucumbers that are or may be taken from houses or beds, but the quantity varies with the season and the care and management of the houses and beds. They can be easily injured by inattention, and are often lost by not having sufficient heat, the houses being run at too low a temperature.

In the hot-beds, after a crop of lettuce is taken off, a crop of radishes can be grown in the same heat; but if lettuce is to follow again, a new heat must be supplied, or partially new. Radishes do not require as much heat, and can be sown, and are often sown, with either carrots or beets, every third row of four inches apart made crosswise of the bed with a marker prepared for the purpose. The radish is a very quick-growing crop and can be grown so quickly that before the carrots or beets that are sown between them are large enough to thin out, the radish crop is gone. Then the whole space is utilized for the other crop, which will mature in six or eight weeks more.

I have described how glass can be used for one crop of radishes and one of either carrots or beets before using the

glass for cucumbers, and all this done before the middle of April, by putting the lettuce in from December 15 to January 1. But the last crop does not require the glass after the radishes are gone, nor when the radishes are growing if it be after April 10. The carrots are thinned out about two inches apart and then left to mature, pulling them for market the last of May or the first of June. The beets are thinned out to four inches apart, those taken out are used for greens and the rest allowed to remain until large enough to bunch, which is sometime in May or by June 1. They bring very good prices at this season, and sometimes it is very difficult to tell, unless a correct account is kept, which crop of the three I have just mentioned pays the best.

Parsley is used to a very large extent at the present time, and is salable all the year. It is sown in spring in the open ground, thinned out to four inches apart so as to produce large roots, and cut two or three times during the summer; and then in September the roots are transplanted to hothouses or hot-beds, setting the roots three inches in the row and the rows six inches apart; or the glass can be put on the crop where it has been growing all summer and continue cutting through the winter. But if it is grown in the hothouse transplanting will be necessary.

Rhubard is a very large field crop and can also be forced under glass and in hothouses. That forced under glass must be covered with manure and plank be put down in the fall, placing the glass on in March. This is pulled twice before the outdoor crop and then left for another season. That grown in houses must be dug in the fall, placed in the cellar, and put into the house or forcing-pit early in January, so as to come into Market in March.

Spearmint is a plant that grows from long roots dug from the ground, and when transplanted into houses or beds can be cut all winter into small bunches and sold at large prices for making juleps and sauces for spring lamb for the table. The demand is quite limited, and therefore small quantities are grown.

Tomatoes are grown quite largely under glass in houses. They are started in July and grow quite slowly through the fall and winter, and in the spring bear their fruit. The price obtained for them is about fifty cents per pound, which is \$30 per bushel. A house full would not amount to as much as one of cucumbers, but they are not so much care as cucumbers. Only a few of the very dwarf kinds can be grown under glass, such as the Champion, Prelude, and Atlantic Prize.

Cauliflowers are started early in winter and are transplanted in the houses and grown as a spring crop, coming into market in May and June. They are grown in this manner largely on Long Island. The very dwarf varieties are the only ones that can be forced.

There are few crops that cannot be grown under glass, but many of them will not pay for growing. They are shipped in such large quantities from the South in spring that the price is not enough to warrant the attempt to grow them under glass.

In Montreal the melon is the principal crop grown under sash, and in New England they can be grown to perfection only in this way.

To command the best price for stock of any kind, the best animals must be procured to produce that stock. The best butter is obtained from the highest standard of milk. So the best vegetables can be produced only by the use of glass, where all the conditions required to produce them can be controlled. Our climate has changed in the last ten years to a great extent, and cannot be depended upon as previously. Some years ago melons and cucumbers could be grown in the open field to perfection, but now they can be grown only under glass.

HOTHOUSES.

These have been used for vegetable-growing only about ten years in this vicinity, or near Boston, but many are now used. The expense of building them is quite considerable. To build a house 24 feet wide will cost \$10 per running foot;

that is, a house 200 feet long and 24 feet wide will cost \$2,000 with everything complete. One thirty feet wide will cost but little more — perhaps \$200.

The slant of these houses, where they are erected for growing lettuce early and cucumbers late, is one foot to every four feet in length of rafter. For a house for cucumbers only, I would prefer a steeper one with slant both ways, the house for lettuce slanting only one way. The lettuce house should slant to the sun, while the cucumber house should end towards the sun or towards the south. The cucumber house should have two thicknesses of glass and the lettuce house one thickness double thick.

HEATING HOUSES.

There are different ways of heating houses — by a flue, by hot water, and by steam. The oldest way is by a flue, placing the boiler at the low end and making the chimney at the other end, with a brick flue through the house. A short house can be heated in this way very cheaply. The hot water method is best for small houses or a number of small ones where you do not do enough business to keep a night man.

To heat a house twenty-four feet wide, ten 2-inch iron pipes are required, placed at not over six feet apart, with two pipes on either side and the boiler at the lowest end. To heat by steam, eight 1½-inch pipes will be sufficient, placed at about the same distance apart. There is not much difference in the quantity of coal used by hot water or steam to produce the same temperature.

To heat a house for the season, from October 1 to May 1, a period of seven months, will require for a 24-foot house two tons to every ten feet in length, but the larger the house the less coal in proportion will be required; for a house 100 feet long, twenty tons of coal will be required; for a house 200 feet long, thirty-five tons; while for a house 300 feet long, only fifty tons will be needed. This is to grow lettuce until March and then cucumbers, but if cucumbers are to be grown all the year more coal will be required, because the temperature must be kept higher.

Most of the houses being built at the present time are thirty feet wide and are considered more economical than narrower ones. It costs more to put in the heating apparatus for hot water than for steam, the pipes being much larger and more of them. One 1½-inch pipe for steam is equal to one 4-inch pipe for hot water.

SASH.

The sashes used for forcing are three feet by six feet in size, with frames two inches thick and five rows of double thick glass six by eight inches in size and lapped about one eighth of an inch over each other. They are much stronger when lapped than when butted, will last longer, and are warmer. A well-made sash will last a number of years. I have some that are twenty-five years old and they are good now. The sash should be kept under cover in summer and should be painted every three years. Large quantities are used by market gardeners, and while they cost about \$2.25 each, will always bring a good price if obliged to be sold at any time, especially if they were the best to start with; so there is not much depreciation in sashes, and generally they will produce every year enough to pay their cost.

Under glass the various insects that trouble vegetation can be more easily taken care of than in the field. In stormy weather it is also more pleasant to work in the houses than it is to work out of doors. It is also more profitable to use the houses when understood, but more expensive to commence.

In some foreign countries, nearly all the fine vegetables produced are grown in houses. Our climate here in New England is getting to be so variable that the only way to be sure of a crop and to have a continuous one is to grow it in houses, especially where the climate is such that there are frosts nearly every month in the year. The demand for fine vegetables is increasing to a large extent, and will continue to do so, and the demand for young men who understand this business is greater than for any other branch of agriculture. Good salaries will be paid to those who educate themselves to follow this calling, and any one who understands this business will

have no trouble in obtaining a situation or of getting a good living for himself and family.

All of our best and most perfect flowers are grown in houses, and the business is somewhat overdone; but in the market garden business it is different. Flowers are a luxury and can be had only by those of large means, while vegetables are not only a luxury but they are also necessary for table use and cannot well be dispensed with.

A market gardener of to-day cannot afford to be without a hothouse or a number of them. The use of them will increase all over the Northern States and all the market gardeners will find it to their advantage to cultivate less acreage of out-door crops and devote more of their time and attention to the growth of vegetables under glass.

Many advances have been made in many departments of agriculture the last thirty or forty years, and the same is true of all branches of business. We have gone from traveling by horse to steam, and from that to electricity; from the oil lamp to kerosene, then to gas, and then to electricity; from nearly everything made by hand to that made by machinery; from the cow fed on hay to the one fed from the silo; from the large farm to the small farm. And here I may say that the reason for so many deserted farms is, that everything is being concentrated and the way-back farmer is obliged to move near the city, carry on less acres, and produce more goods for less money. So it is with market gardening. It began in the field with one crop each year, then two crops, now three or four, and from many kinds of crops to a few which are the most used in the locality, and then under glass where all the conditions can be controlled and more and better results be obtained.

But to be successful in this branch requires much study and practical experience. A large amount of capital is required, and with all these great results must be obtained or it would not pay.

In this locality with a cool climate and short season, the use of glass will become a necessity, and the first to build a large

greenhouse will be the leading one among you, though he may, and will be, called a fool or a crazy man. The great improvement in producing crops made the past twenty years is only a commencement of what is sure to come in the next twenty, and in that time I expect to see, or those may who live to see that time, many large greenhouses in this city and surrounding towns, where can be grown all vegetables needed for your market in the winter as well as in the summer; and to those who understand it will come sure success and they will be well pleased with their trial of market gardening under glass.

MR. PHILBRICK: I would like to know the variety of beet you use.

MR. RAWSON: The Improved Egyptian. That is about the only sort that can be forced. The seed of that particular kind has not been in the market a very great while. There are only one or two men in the country that hold that seed. I am the one that introduced the seed.

MR. PHILBRICK: You are the man that improved it?

MR. RAWSON: I am not the man that first improved it. I got the beet and put it into the market and continued to improve it. I got two dollars and fifty cents a pound for the seed until last year. Last year I sold it for a dollar.

MR. GERRISH: How far apart do you have your beets for a late crop?

MR. RAWSON: I drill in the seed, and thin out the beets about a foot apart—that is, the beets you grow for fall use. If you do not wish to have them grow very large, you thin them out so they will be four or five inches apart. The beets under the sash, of course, have got plenty of nourishment supplied to them right along. If not, you can give it to them. So you can grow those quite closely together, while those in the field you have to give more room and should thin them out about twelve inches apart.

MR. CONNOR: Can you tell how a farmer of ordinary means can keep his beets during the winter?

MR. RAWSON: He wants to pull them before they freeze very hard in the fall. They will stand a freeze of perhaps twenty-four degrees, but I don't like to have it go down to twenty. I generally pack them in a narrow trench in the fall and throw over them some dirt. I leave them there until the ground freezes a little, then I put them into a pit that I build purposely for them. I cover them with boards and pitch the boards so that the water will be carried off, and place a little sand on them. That is the way I keep mine. But the beets may be kept in the trench where first placed. I would rather have the ground freeze on top of the beets than not, in order to keep them.

MR. CONNOR: How would you store them in a cellar?

MR. RAWSON: I would not store them there.

MR. GERRISH: Enough for the family — a barrel of beets.

MR. RAWSON: I would place the beets in the coolest part of the cellar and cover them with sand. I was speaking of two or three hundred bushels. I suppose that the difficulty you have is that you put them in too soon after you pull them. Leave them out for some time after you pull them, and you will find them in better condition to keep. They should be perfectly cooled in order to keep.

MR. PHILBRICK: The trouble with the beets is that they shrivel.

MR. RAWSON: They are put in too soon or else they are left out and allowed to chill, and they commence to decay before they are put in. Take them up as soon as it begins to freeze a little and put them into a hole somewhere, putting three or four inches of dirt over them, but do not leave them in the ground until they are frozen.

QUESTION: Would you cut the tops off?

MR. RAWSON: Cut them off or twist them off. I should think they would keep as well to twist them off, especially if you cut them too close.

QUESTION: Sometimes we find beets scabby like potatoes.

MR. RAWSON: You have got some worms on the land. I should say a little lime would be good if you had anything of

the kind there. By putting lime on, I don't think you would have any trouble. We have very little trouble in that way, because we have so many beets that they have enough to do. Once in a while we will have a beet eaten, but not very many.

The Montreal melon is considered the very best, but they are grown entirely under glass. I have never seen a watermelon grown under glass, only the muskmelon or cantaloupe melons. There is no limit to the price. I have sold them four for ten dollars—two and a half dollars apiece. In Montreal they grow them very largely. I was in Montreal a few years ago and saw them in the market. I bought a dozen of the melons, paying the man five dollars for them. I planted the seed the next season and got a tremendous crop. I sold two thousand dollars worth that grew on a half acre of land.

MR. GERRISH: Do you go North for your seed?

MR. RAWSON: Yes, sir, I do.

QUESTION: Do you find more difference in melons than anything else that you go North for your seeds?

MR. RAWSON: No, sir, I do not know that I do.

QUESTION: Is that difference more apparent than in anything else—more than in squashes?

MR. RAWSON: Not at all. The melon seed is like the squash seed. Nature controls the elements in such a shape that we cannot produce the squash seed and guarantee that it is pure.

MR. CURTIS: How can you get them pure?

MR. RAWSON: We get them as pure as we can. The bees will mix them if there are any melons of a different kind within a mile or two, and you cannot help it.

MR. GERRISH: Can you raise any squash where the vines are united?

MR. RAWSON: You will not have any seed at all to do any good.

QUESTION: Where are your seeds grown?

MR. RAWSON: I have a few of them grown in Burlington, Vt., and the northern part of Vermont. The greater portion of my seeds are grown at North Olcott; I think nearly all of them.

MR. SESSIONS: Is not that largely because the customers are more particular and you cannot satisfy the market with the same kind of product that you could a few years ago?

MR. RAWSON: No, sir; I cannot get a good crop. If I could get a good crop, I would produce it.

MR. SESSIONS: What would satisfy the market ten years ago will not satisfy it to-day?

MR. RAWSON: No, sir, in one sense of the word it will not. When you get hold of these Montreal melons, the small cantaloupes are of no consequence. They want the other. Still I cannot grow them. The seasons are not long enough and there are sudden changes in the weather. A big rain storm on a piece of melons will kill them.

MR. CONNOR: It seems to me that you cannot attribute that all to the change of climate. We used to raise big crops of boys around here.

MR. RAWSON: I lay this to the climate.

MR. CONNOR: We did not use to have any trouble raising them; now we have a good deal of it.

MR. GERRISH: They raise them under glass too much.

MR. CONNOR: Yes; too much of the hothouse process is the trouble. They don't take the glass off soon enough.

MR. PHILBRICK: You have not told us whether you heat with steam or with hot water.

MR. RAWSON: I put in hot water when I first built my houses. I put up three large houses, 160 by 24 feet, and I put in hot water. After I had run them one winter I found that the boilers were not large enough. There were three boilers, one for each house. I wanted a steam boiler to do my pumping, and after putting that in I thought that I would run a steam pipe through to each one of the houses — one out and one return — from this steam boiler. After I placed those in the houses, I used to run the steam boiler in connection with the hot water boilers. I found that I would not require but one boiler to heat the three houses with steam, and made up my mind that I would rather take care of one boiler than of three. I built two or three more houses and heated

them by steam, and I am running them by steam to this day. I think I was the first one to introduce steam in running a greenhouse — in our locality at least.

I have spoken here of the electric light. Perhaps that may seem peculiar to some of you, and I want to tell you how I happened to use it. On different sides of my house I set out a great many plants in the spring of the year, perhaps three thousand different plants. On the north side I found that I could not grow the plants very well. They would grow stunted and slow all summer. Two or three years afterwards, I think about five years ago, the town adopted the electric light in place of the gas light, and there was one of these arc lights placed within about seventy-five feet of my house. This was of two thousand candle power. I set out my plants that year as usual. The plants on the north side of my house grew better that year than on the south side. Of course I attributed it to the electric light. I immediately contracted with the electric light company to put me up an electric light over my greenhouses and also incandescent lights inside. The incandescent lights did not work well and they were taken out, but the arc light I found of great advantage. It did not cost me a great amount to try the experiment — one hundred dollars or so; yet I was satisfied that it was three or four hundred dollars benefit to me. I tried that for three months and found that it reduced the time required to mature the crops fifteen per cent.

MR. PHILBRICK: Have you ever tried sending an electric current in the earth in which your plants were growing?

MR. RAWSON: No, sir.

MR. PHILBRICK: I have read of its being tried and being a success.

MR. RAWSON: The town was using so many lights that I could not keep them this year, but next year they are going to put in another line and I shall put up three electric lights.

PROF. WHITCHER: Do you have them outside of your houses or on the inside?

MR. RAWSON: The arc light is on the outside of the houses

and shines on the plants through the glass, just the same as the sun, increasing the length of the day.

PROF. BREWER: You are well satisfied that it is a benefit to you?

MR. RAWSON: Yes, sir.

QUESTION: How much would such business pay a young man?

MR. RAWSON: One hundred dollars a month.

VOICE: I want a young man, and I will pay him a hundred dollars a month if he is capable.

MR. RAWSON: I can make use of twenty-five men of that kind.

MR. CURTIS: Will you board him?

MR. RAWSON: Yes, if he is a first-class workman; we need some good workmen.

MR. CURTIS: Where shall they go to learn?

VOICE: Go to Rawson.

MR. RAWSON: I will give it up. Where they come to me they don't get away very soon.

MR. CURTIS: You would not like to have a lot of students around?

MR. RAWSON: I do not know as I would; still, I feel as though I ought to have some.

PROF. BREWER: How far could this business be taught in schools?

MR. RAWSON: It can be taught to a very small extent.

PROF. BREWER: And only to a small extent?

MR. RAWSON: And only to a small extent.

PROF. BREWER: That is, supposing you had an agricultural class of fifty; could you teach the fifty?

MR. RAWSON: If I had the school on the place I could teach them.

MR. GERRISH: How many boys could you get into your house at a time to show them how to do it?

MR. RAWSON: A good many of them.

MR. GERRISH: Fifty?

MR. RAWSON: Yes, sir. I have a house that would hold from one hundred and fifty to two hundred.

PROF. WHITCHER: Could you give them the necessary attention if you had fifty?

MR. RAWSON: Certainly I could, and I would if I was paid for it.

PROF. WHITCHER: You think it is possible to give a class of fifty the personal attention needed?

MR. RAWSON: I could not do it as well as with three or four.

MR. CURTIS: You could let them work with your men?

MR. RAWSON: Yes. The trouble with me is to get them boarded.

QUESTION: You go to work before nine o'clock on your place?

MR. RAWSON: Yes, we believe in the eight-hour law—eight hours right straight along; eight hours in the forenoon and eight hours in the afternoon. We are not exactly like the labor lodges. They want eight hours for work, eight hours for play, and eight hours for sleep. I have found it takes about sixteen hours for me to get around, and I have had to conform to that right straight along.

In speaking of this subject of education in this business, I would say that I do not know of any way but the practical. It can be done in that way, but it would have to take from three to five years. That would be little time enough. It has taken me twenty-five years to get where I am, and a little more than that.

MR. SESSIONS: Are you learning still?

MR. RAWSON: Yes, every day, and I have to be a pretty apt scholar sometimes, too.

PROF. BREWER: You have paid something for your education?

MR. RAWSON: Yes, it has cost me very dear; and I am afraid that I should want enough to repay me if I was going to educate twenty-five or thirty young men. I should want a pretty good salary. I would do it on a salary if it would not frighten them. I should want as much as I was getting in my other business, and then I could afford to do it and follow it up.

MR. PHILBRICK: You said that this spring you were having some young men go there to learn the business. Do you give them any compensation the first season?

MR. RAWSON: Of course I do. I give them the same as the laboring man, provided they board themselves and do as the rest do. I tell them that if they do not do a day's work the same as the rest of the men, I shall have to give them pay accordingly. I do not charge them anything at all.

MR. SESSIONS: Why cannot he have his hothouse ten miles out of the city just as well as five?

MR. RAWSON: He is so much farther from the market, that it would cost him more to get his produce to the market and the manure from the city to his place.

QUESTION: Is it not more largely on account of being where you can get the manure conveniently than on account of shipping the produce?

MR. RAWSON: Yes, sir.

PROF. BREWER: I strongly suspect that you cannot find a place in the United States where grain can be raised at a profit twenty miles from the place of shipment. I went all through the grain regions of the West, and as soon as you got over ten miles beyond the railroad the extra expense of carting ate up all the profits.

MR. RAWSON: Of course it costs a man more to cart his goods than to send them by rail. Then again, if a man is near the market and the market happens to be in want of any little thing, he can supply them; and if there is any catch in the market, it will be the man near the market that can take the advantage of it and not the one ten miles out.

The farmers of to-day have had the idea, that if they had twenty-five cords of manure they must scatter it over ten or twelve acres, whereas, it would be better to put it on two acres. If they wanted to raise one thousand bushels of potatoes on two acres, they might do it in good shape. I would put my manure on two acres, and I would put my work there too. I could grow potatoes at forty cents a bushel on two acres where I could not for fifty cents on five.

PROF. BREWER: Are not plant lice on vegetables grown under glass very common?

MR. RAWSON: They are very common, and if the proper methods are not pursued to get rid of them, they will do much damage. I smoke all my houses whether I know there are plant lice there or not. When the plants are quite young, — generally after two or three weeks' growth, — I have to smoke all my houses where those plants are. I use tobacco in smoking them. I smoke them three or four nights running. The first night will not kill them; the second night will make them kind of drowsy; the third night lays them all on the ground so that you can see them; the fourth night will complete the job. But if you smoke them one night and leave them three or four nights, they will get a fresh hold.

QUESTION: Tobacco is not harmful to the plants?

MR. RAWSON: No, sir, if you do not burn the tobacco so that the plants will get the full strength of the fumes. Soak the tobacco with water before you put it into the heater, then put it into the heater and put a fire in. When you have got it to smoking in about the right shape, take your fire out of the heater, and set the heater in the house. When you have got the house thoroughly smoked, do not leave the heater standing there, but take it and go into another house. One man can smoke three houses like mine in a short time.

MR. CONNOR: Do you fill the houses full of smoke?

MR. RAWSON: Solid full, so you cannot see your hand.

QUESTION: Cabbages that were not quite headed last fall, would it be advisable to leave them in the ground until warm weather and head them more?

MR. RAWSON: That would depend with me upon how they sell.

QUESTION: For my own use.

MR. RAWSON: I should keep them covered well until warm weather came.

QUESTION: Would they put on an extra heading to leave them until warm weather?

MR. RAWSON: I do not think they will. They will keep

on heading to a small extent, but you will find that cabbages put in in the fall would nearly all be headed quite well at this time. They will do well enough to carry to the market and get one dollar and fifty cents or two dollars a barrel for them, and that is good enough for me.

QUESTION : Is there any way of keeping the insects off from very early turnips ?

MR. RAWSON : I do not know of any, except not to plant them.

MR. PHILBRICK : What do you say about keeping the striped bugs from your cucumbers and squashes ?

MR. RAWSON : I use ground plaster and Paris green.

MR. PHILBRICK : Calcine plaster ?

MR. RAWSON : Yes.

MR. CURTIS : In what way ?

MR. RAWSON : I generally mix half a barrel with a half pound of Paris green and sprinkle it over them.

MR. SESSIONS : How much weight is a barrel of plaster ?

MR. RAWSON : Two hundred and fifty pounds.

QUESTION : A flour barrel ?

MR. RAWSON : They come in casks, a common lime cask, and a pound of Paris green to that.

PROF. WHITCHER : Do you mean common land plaster ?

MR. RAWSON : No, not common land plaster — similar to plaster of Paris.

PROF. WHITCHER : Is it not just white gypsum ?

MR. RAWSON : I suppose it is.

MR. GERRISH : Is this plaster finer than ordinary plaster bought by the ton ?

MR. RAWSON : It is.

MR. PHILBRICK : That is all the advantage it possesses ?

MR. RAWSON : That is all ; flour might do just as well.

MR. CURTIS : How would spraying do ?

MR. RAWSON : I think that would have the same effect, but it would take a little longer to make the spraying apparatus.

MR. CURTIS : I am speaking of a small patch.

MR. RAWSON : I should think it would do as well ; take a fine spraying water-pot.

MR. GERRISH: You would have to watch the weather when you did it in that way. You have got to do it when it does not rain.

QUESTION: Is not one advantage of calcine plaster that it stays on better?

MR. RAWSON: Yes, it stays on better. I have to use it about three times a year. I do not know how many barrels of plaster I use, probably eight or ten.

MR. CONNOR: How about the black bugs that work underneath?

MR. RAWSON: I would catch them by placing shingles on the ground.

QUESTION: How do you keep your squashes from rotting in the winter?

MR. RAWSON: I sell them in the fall. But the best way to keep them is to have a house purposely for them, having the temperature from forty to forty-five degrees. Do not place them too thickly on your shelves. I keep mine the other way by selling them in the fall and getting rid of them. I have so many vegetables that I am obliged to sell everything as it grows.

MEMBER: In other words, you keep your squashes in your pocket.

MR. RAWSON: I get them there, but they don't stay there long.

Perhaps some of you have not much of an idea what market gardening is. Through the summer time I keep seventy-five men, have market wagons running every day in the year. I have forty men at the present time. That may enable some of you to imagine what the business is.

I have recommended small acreage. I cultivate one hundred acres. Some of you may say that I do not follow out my own theory. The reason I have so much land is this: I am obliged, carrying on so large a business as I do and having so much glass, to use a certain quantity of manure in the winter time. I am also obliged to have that manure teamed out from the stables in the summer time as well as in the win-

ter, in order to have it near by when I want it. For that reason I buy my manure in large quantities and in the summer time I team it out from Boston and pile it up. Of course I have to have some land to pile it on. Also after the manure has been once used in the beds, you cannot very well sell it again, although there is some goodness in it still, and the most valuable way for me to utilize it is to have land to spread it on. I buy from twenty-five hundred to three thousand cords of manure, and I am obliged to have some place to pile it; for that reason I have as many as one hundred acres.

QUESTION: What does manure cost at the stables?

MR. RAWSON: One dollar a cord.

QUESTION: Not much straw?

MR. RAWSON: Yes, considerable straw. Manure during the past few years has reduced in price one half.

QUESTION: Is not that owing to a reduction in fertilizer? Is not that due to the reduced cost of phosphates?

MR. RAWSON: I do not know as it is — no, sir.

QUESTION: Is phosphate a good substitute for manure, take it in your business?

MR. RAWSON: No, sir.

QUESTION: You use some phosphate, do you not?

MR. RAWSON: Very little. I use it concentrated; that is, I use sulphate of ammonia, nitrate of soda, and muriate of potash to a small extent. I use some fifty tons of wood ashes, four or five tons of ammonia; but as to a substitute for manure, I do not believe they have got it yet.

VICE-PRESIDENT: This discussion is very interesting and I would like to have it continued farther, but it is past the time of adjournment. This afternoon we have a programme which I think will be of interest to you all.

Adjourned to 2 P. M.

AFTERNOON SESSION.

At 2 P. M. the meeting was called to order by the president, who immediately introduced Hon. W. R. Sessions to address the meeting.

HINDRANCES TO SUCCESSFUL FARMING.

BY HON. W. R. SESSIONS, SECRETARY OF MASSACHUSETTS
STATE BOARD OF AGRICULTURE.

There are many of these obstacles, some beyond our control that must be endured, or overcome, or worked around, as the case may be. Of this class, New Hampshire is said to have its full share.

The American additions to Chambers' Encyclopædia, published in 1881, says: "For many years its agricultural interests have been declining. The soil never was very fertile, and much of the land which was once productive has become worn out by long use. This fact in connection with the severity of the climate has caused many of the younger generation to seek new advantages in the West." In the English print of the same work we read: "The soil except in the fertile valleys is better adapted to pasturage than culture. The winters are long and cold, so that in the mountainous regions mercury sometimes freezes."

Truly these are not inviting or encouraging conditions; still they are better than those of the country where the hymn says, "Every prospect pleases and only man is vile." It is a notion of mine that the greatest obstacles to success in any business are to be found in the men who follow it. Cromwell said, "Trust in God, but keep your powder dry." Napoleon, "the man of destiny," as he was sometimes called, said that "Providence was on the side of the heaviest artillery," and there is an old adage, "Providence helps him that helps himself." These are the principal texts in my gospel of success, as well in farming as in war or commerce.

The early settlers of New Hampshire were all farmers. They were a stalwart, hardy race, both in mind and body. They feared not a contest with misguided men any more than they did with the forests that covered the soil they desired to subdue and make into fertile farms. They, like the settlers in Massachusetts, came from the old country to their new homes, with wives and children, with their few household goods and

fewer cattle, risking danger from savage foes and starvation in a new country. They did not whine and growl about hard times and every time they met endeavor to excel each other in an effort to prove that farming did not pay, but boldly facing the situation, determined to make it pay. They made a success. With almost superhuman energy, they removed the forests; made farms; built homes, churches, schoolhouses, villages and cities; and for more than two hundred years grew in agricultural prosperity as well as in population. In the colonial days there were no manufacturing centers. Great Britain not only discouraged manufacturing, but by law forbade the people to engage in such pursuits.

It was the farming population which settled New Hampshire, that preserved it from the terrible dangers of the early days, that, in connection with a like population in the other colonies, won the independence of the nation. Conditions of wealth and population have wonderfully changed. The change in modes of living and methods of business has been equally great. Then the necessities of the farmers' family were supplied by food that their own soil produced, by clothing made by the household from wool and flax grown on the farm. The times were hard then, and no doubt those men contrasted their condition with that of the merchants and professional men of the old country. The burdens of private, municipal, state, and national debt brought upon them by war were oppressive. Turbulent spirits planned rebellion that they might escape the load of debt and taxation, but the patriotism of the farmers triumphed. Peace and prosperity came again. The fathers of the republic wisely encouraged manufactures, that the people of the country might cease to depend on other nations.

The war of 1812 found the country much advanced both in manufactures and commerce, but the nation was still an agricultural one. The stagnation of business caused by the waste and expenditure of war again brought on hard times. Again patience, patriotism, and perseverance triumphed and prosperity followed. Unexampled growth in population, arts, and

manufactures attended that prosperity. The War of the Rebellion came, and has been followed by another era of hard times for the farmer. We cannot say that the farmers of to-day are actually in a worse condition than were their fathers a generation ago. Relatively, they may be, for other kinds of business have outstripped agriculture in wealth-getting, and those who follow other callings have established the standards of living. The luxuries afforded only by the rich of fifty years ago are now the necessities of the poor. The style of living that the bulk of the community can to-day afford, is too costly for the income of the average farmer. This is not as it should be, but is easily accounted for. Population has wonderfully increased. Cities and manufacturing villages have grown up by every harbor and along all our streams, until, in place of the few farmers of the early days, New Hampshire now has a population of 376,000, of which perhaps 30,000 are farmers. This population, with that of Massachusetts (as convenient to you as your own), consumes enormous quantities of farm products. But prices do not increase. On the contrary, they average lower than formerly, because the supply of staple farm products has more than kept pace with the demand. The policy of the government has encouraged the settlement of vast areas of new land by emigrants from Europe. In the last ten years more than 2,000,000 workers in agriculture have been added to the 7,000,000 previously employed in the business. This new domain tilled by this large army of agriculturists has produced vast amounts of grain and meat out of all proportion to the number of laborers employed. Improved agricultural machinery fitted for the level land and mellow soil of the Western prairies has enabled one man to do the work that formerly required from ten to thirty men.

A young man of my acquaintance with one yoke of oxen, pulverizer, seed drill, and binder, by changing work with his neighbors in stacking and threshing time, raised and marketed one hundred acres of wheat and oats without hiring any help except the operator of the machine that threshed his grain. He had no family, and while accomplishing this wonderful

amount of work he lived in a board shanty cooking his own food, "batching it," as he called it. He saved very little money from the year's work, notwithstanding the small expense account. He delivered his grain at the railroad station several miles from his farm. The station was far from the great markets of the country, and freights and speculators absorbed most of the value of the grain, the price received being less than forty cents per bushel for wheat. The product of his one hundred acres came East in the form of flour and feed along with the product of other millions of acres of corn, wheat, oats, and meat that was raised in a similar manner by other new settlers. It was all sold in competition with the products of farms east of the Mississippi. Products raised by men with families that needed and must have homes and home comforts, schools for the children, and all the et cetera of civilization. This unhealthy (I had almost said unholy) competition has so glutted the markets of this country and the world, that the price to be obtained for staple farm products will not enable the family of the Eastern farmer producing them to live as well as the family of the mechanic and wage earner.

Our law makers at Washington seem to forget that a prosperous agriculture is something more than the production of a vast amount of wheat and corn and meat. They are talking now of expensive experiments in irrigation, proposing to expend government money raised by taxation to encourage still more of this ruinous competition with the very men who pay the taxes. This suicidal policy should be stopped at once. It has been ignorantly or thoughtlessly followed for years. The result is over-production and unremunerative prices. It will be time enough to expend government money in irrigation experiments when the demand for agricultural products overtakes the supply, and prices have at least begun to approach a point where the producer can prosper as well as the middle man and the consumer. This foolish and ruinous policy has already caused enormous waste of the heritage of fertility stored up in the virgin soil of our Western prairies by the

Great Father for future generations. But whether our rulers will be wise or not, nature will soon assert herself. The fertile lands have been largely occupied and are being rapidly overrun. Time is sure to bring about an equilibrium between supply and demand, and that condition is not so far away as we may imagine. Already the relative increase in population and the supply of staple food products is bringing this country near to the time when there will be no surplus for export. With all the enormous production of the last twenty years, we are now exporting only ten per cent of the products of our farms, or six per cent exclusive of cotton. We have, say, 65,000,000 people; were population to-day increased six per cent or to 69,000,000, we should use at home all our boasted export of food products.

An author in the November "Forum" calculates from past experience the probable future increase of food products and population, and concludes, that in 1895 the population will reach 72,000,000; and that, with the same amount of food products consumed per capita as is now required, production and consumption will just balance; and that the entire food product of our farms will then be absorbed by our own population.

Whether his calculation prove correct or not, it is perfectly evident that the population that produces no food is increasing much more rapidly than the part engaged in agriculture. In 1790 only 3.3 per cent of our population resided in cities and towns of over 8,000 inhabitants; in 1840, 8.5 per cent were in towns of that size; in 1850, 12.5 per cent; in 1860, 16.1 per cent; in 1870, 20.9 per cent; in 1880, 22.5 per cent; and the census of 1890 will show that at least 25 per cent of our people live in cities or towns of over 8,000 inhabitants.

And to these must be added the vast numbers who live in smaller towns and villages and follow other business than agriculture or none at all. All the increase in population in the older States in the last ten years has been in the cities. The same relative increase of non-agricultural population is going on in all civilized countries. The cities of Europe are grow-

ing almost as rapidly as those of our own country. These facts indicate the near approach of the time when a home market for all American products will be assured, and from that time on, with the same relative increase in population and agricultural products, the demand will increase prices as well as stimulate production and bring the producer into a much more independent position. But meantime the farmer must live and should live well — should live as all free and intelligent American citizens ought to be able to live. How can it be done? Surely not by following the paths our fathers trod. The early settlers prospered by raising their own corn, flour, meat, and vegetables, but they also made their own sugar, raised the wool and flax for the family wardrobe, and the cloth was made at home by the members of the family. The village tanner and shoemaker took the beef hides of the farmer and made the harness and shoes needed, receiving payment for his labor in products of the farm. The wagons and farm tools were made by the neighborhood mechanic, and payment was made for them in what the farmer had to sell. The doctor and minister were paid in the same manner. The best of help was plenty and cheap, and was furnished by the sons and daughters from the large families of neighboring farmers. Such was the condition of our farmers fifty years ago. Now all is changed. Help is scarce and inefficient and commands high wages; the staple farm products are plenty and cheap; but most of the great army of non-producers to be fed, enjoy a liberal income or earn high wages. The summer tourist and summer boarders are certainly of this class. They are willing to spend that income for what they want. They want the best that can be produced. They want it just when they want it and in the most inviting condition. They want the luxuries of life — the finest butter, purest cream, the richest milk, the freshest and nicest vegetables, fruits, and flowers in their season and out of season; and the man who brings them the most desirable products and in the nicest condition, and brings them just when they are wanted, gets a good price and makes a profit. Enterprise, industry, push, business ability will suc-

ceed. Farming is like all other business. It is the man that commands success, not the business that brings it. I will not try to prove that the farmers are prosperous, though much might be said of the peculiar advantages of farm life for both sexes and all ages.

Happy homes in the country which some one has said "God made," might be contrasted with those of the city that the same author asserted were made by man. I will content myself with a few examples of prosperity among agriculturalists who exhibited the same traits and followed out the same business principles that have brought large success to men in other callings.

The business of dairying is, and must continue to be, the main dependence of owners of farms at a distance from market. The low price of beef and pork at present prevailing is a serious drawback to this business. The cows must finally go for beef and the skim-milk to a certain extent be used for the growth of pigs. But the redeeming feature of the dairy business is the large amount of valuable fertilizer furnished as a waste product. Thereby the farmer is enabled to increase the fertility of his farm without the outlay of cash for manure. Professor Roberts of the Cornell University Agricultural Experiment Station said at the last public winter meeting of the Massachusetts State Board of Agriculture: "Some six or seven years ago I sampled every load of manure that went out of our covered barnyard. I found we had produced in our barnyards upwards of \$1,600 worth of potash, phosphoric acid, and nitrogen computed at ordinary prices. This so astounded me that I dared not publish it and so the next winter I took particular pains to count all the animals, to estimate very carefully the amount of food they consumed and to sample again, and weigh every load of manure that went out of the covered barnyard, and, lo and behold, I found the results of the winter before verified. There were about forty-five head of cattle, eighteen or twenty horses, and so on. And don't forget this if you forget all the rest, that with an ordinary ration and an ordinary animal with ordinary

prices the manure produced by an animal is worth one half the cost of the food fed to it." Other chemists have by analysis proved that the value of the excrement of a well fed cow for the winter feeding season of 191 days is worth, at market prices of commercial fertilizers, \$24.88. Dr. Goessmann of the Massachusetts Agricultural Experiment Station assures me that these elements found in stable manure are in the best form for plant food and are consequently worth as much as these same elements are in the highest priced commercial fertilizers. Dr. Goessmann has also proved by practical experiment as well as by chemical analysis that skim-milk is worth for feeding purposes (making pork at $5\frac{1}{2}$ cents per pound) 1.9 cents per gallon. While Professor Cooke of the Vermont Agricultural Experiment Station by his experiments has proved that a gallon of skim-milk has in it the elements of nutrition which are worth 1.6 cents if reckoned in proportion to these same elements in grains at the market price of the grain. A cow that will give eight quarts of milk per day for 300 days, the minimum standard for a profitable cow, will furnish about 450 gallons of skim-milk worth at Prof. Cooke's price \$7.50 if corn and oats are worth the average market price. They are above the average price this year and skim-milk is worth proportionately more. This 450 gallons of skim-milk will weigh 3,825 pounds. The chemist finds that there is in a ton of that skim-milk \$2.53 worth of fertilizing elements, equal to one cent per gallon for skim-milk. Take out 20 per cent, which chemists tell us is dissipated by digestion, and we have \$2.02 per ton as the amount of fertilizing elements remaining in the excrement after feeding a ton of skim-milk, or \$3.82 for the 450 gallons furnished by the cow. So we have \$24.88 as the value of the fertilizing elements in the winter excrements of a cow; \$7.50 as the feeding value of the year's product of skim-milk; and \$3.82 as the value of the fertilizing elements left after feeding the skim-milk,—or a total of \$36.20 as the value of the waste products of a single cow used in butter making,—and this estimate makes no account of the manure of 174 days when the cow may run to grass. If the

great hindrance to successful farming in New Hampshire is the lack of fertility in her soil, here then is the business that will enable the farmer to sell his products in a form that will not take along with them the elements of fertility of the farm. His farm may grow richer just in proportion to the increase of his sales. I believe the dairy business, if conducted with shrewdness in the choice and care of cows, special care to produce extra quality of product and to make a reputation for what is produced, will bring financial success at present prices whether conducted individually or on the coöperative plan.

I have in mind a man in western Massachusetts who has made a competency in this business. Coming into possession some twenty-five or thirty years ago of a run down farm with buildings worse run down than the land, he determined to bring up the farm and make money out of it at the same time. He believed that dairying was the business that would help him to accomplish it. The farm would then support in the way it had been carried on about eight cows and a team. Much of his land was suitable for the production of corn, oats, and grass. He began by increasing the number of his cows and trying by manuring and reseeding his meadows to raise the needed fodder. He was one of the first to adopt the silo. He has increased his business until all the fodder for one hundred head of neat stock and five horses is produced on that old run down farm. He is to-day milking about fifty cows, making two hundred and fifty to three hundred pounds of butter per week, most of which is sold at retail to customers in a manufacturing town ten miles away, at thirty-five cents per pound. He has built a good house for himself, another for his son, still another for his principal hired man. He has a little village of buildings, is out of debt, has accumulated money, is a member of the board of selectmen of his town, a member of the Board of Agriculture and also of the state Legislature. He is interested in all that is for the welfare of his town. He is a deacon of his church and has for three years been a Master of the local Grange. He is a successful

man. But he has an immense amount of push. He has studied his business both in production and marketing. He has a fine herd of cows for butter making of his own breeding. He has learned to make No. 1 butter and take it to market in attractive shape, to be prompt and regular in supplying his customers, and so has been able to get the very best people in the town on his list. He personally attends to his butter making and marketing. In short, he has applied business principles to his business. If I mistake not you have not a few examples of this kind in New Hampshire.

I am acquainted with a man in a neighboring State, about fifty years of age who in early manhood engaged in mercantile affairs, followed the business for about ten years, and like a large proportion of those in the same business made a financial failure, losing all he had. He had a taste for gardening. His town with a manufacturing population of three thousand would, he thought, furnish a market for a limited quantity of fine vegetables at good prices. He leased a small piece of land and began business, working, studying, and experimenting, striving to produce a better product than that market had seen before. His business increased. He gradually worked into the greenhouse business, finding that the earliest and finest products brought the most profit. He has been in the new business about ten years. Last year he sold \$16,000 worth of greenhouse products, mostly cucumbers, sending them to New York, Boston, and even to Chicago, having outgrown his home market. This man who worked hard enjoyed little and made financial failure in ten years of mercantile business, has enjoyed life, been successful and respected, helped his town by his agriculture, and, incidentally, in the last ten years accumulated not less than \$30,000. He has not employed a large amount of help, but two sons interested in his work have been his strength and are settled with him in business, contented because prosperous.

Another, whose early manhood was spent in a manufactory, finding his health failing bought a farm of seventeen acres and went into small fruits and poultry and for several years has cleared \$1,000 per annum.

But he is keen for business, has learned his business, made a reputation for fine products, and has retail customers for all his goods in his town of eight thousand inhabitants. He pleases them and they pay him for it. I cannot refrain from giving you a leaf from the experience of a clerk in a store in one of our thriving towns. His close confinement at business for several years without opportunity for exercise in the open air had broken his health. His physician advised him to eat freely of celery. The market of his town did not furnish it so he felt compelled to raise it himself in a little plot of land attached to the tenement he rented. He began with a few plants, learning how to treat them by reading and experience, increasing the number from year to year soon having a surplus to sell. As his product was first class he readily found purchasers at good prices. For the past six years he has sold from his little plot of land, only nine hundred square feet, an average of \$75 worth of celery. This is at the rate of \$3,600 per acre. He has hired a little more land and is increasing the business. He still sticks to the store, having regained his health, but he attributes his recovery to his outdoor exercise in odd hours rather than to the medicinal effects of the celery. He is enthusiastic in the new work and is about leaving the store for gardening.

I might describe the condition of many others who have made marked success, accumulating money, living in affluence, respected and honored by the wealthy and educated. They have all followed the same principles of business though their products varied in kind. They have produced what was wanted, and when it was wanted, and the best of the kind that the market affords.

I must not withhold my most marked example of success. In the little State of Rhode Island a firm composed of father and son are engaged in market gardening extensively. The business was begun in a small way by the father more than thirty years ago with a small capital earned in working for others. It has grown year by year. The son grew up in the business, profiting by his father's experience and the experi-

ence of others. To-day they have more than three acres under glass, selling last year as one item from the hot-beds and greenhouses \$40,000 worth of lettuce to one firm in New York. They farm 500 acres, employ 100 men in winter and 175 in summer, 75 horses, 12 yoke of oxen, had last year 150 acres of cucumbers for pickles, 45 acres of green corn, 45 acres of peas, 35 acres of turnips, 12 acres of asparagus, 25 acres of spinach, 15 acres of tomatoes, 10 acres of horseradish, 5 acres of kale, 10 acres of onions for pickles, 8 acres of peppers, 8 acres of cauliflowers, besides large amounts of other fine garden products that I will not take your time to enumerate. His market is Boston, New York, and Chicago, as well as the near city of Providence. His pea vines, corn stover, and the hay he raises for rotation are sufficient to supply the fodder for his teams. He makes his own pickles and catsup, and prepares his own horseradish, markets the pickles by the barrel and half-barrel, bottles his catsup and horseradish, using between three and four thousand barrels of vinegar in the business. More than fifty thousand bushels of cucumbers, onions, peppers, tomatoes, and cauliflowers — all of his own raising — passed through his pickle vats the past year. This business began thirty years ago in a very small way, their whole product being then prepared in one little kettle on a cooking stove. He purchases five thousand cords of manure in Boston besides what he gets in Providence. The amount of their sales is something enormous, enabling them to live in opulence and enjoy the privileges and pleasures of the millionaire. This has all been accomplished by strict attention to business, always having an eye to the main chance. I need not say that their superior business ability has been assisted by unflagging industry, energy, and perseverance, and in the early days with their own manual labor and the strictest economy.

In the October bulletin of the Delaware Experiment Station is given an illustration of success following conformity to the necessary conditions. "A vineyard measuring 45,888 square feet of land has this season produced a crop

which sold for \$933.24. Of this amount \$710.75 was left after harvesting, shipping, and commission expenses had been paid. This is equivalent to \$674.30 per acre. It is admitted that good tillage, skillful tending, and generous feeding of vines was associated by the owner of this vineyard with extreme neatness in preparing the fruit for sale and with business ability in finding and holding a first-class market. All of these points, however, would have availed at most only one third of the above sum had this vineyard remained in 1889 and 1890 unprotected against the attack of the black-rot fungus." This vineyard was sprayed in 1889 and 1890 with a preparation recommended by the Experiment Station. He had a full crop while his neighbors, who through ignorance or lack of enterprise neglected the necessary precaution, had less than one third as much.

I might give you a leaf from the experience of the owner of an apple orchard. In the spring of 1888, the great apple year, he sprayed his orchard with Paris-green water. In August he thinned his fruit at small cost, picked his apples carefully and kept them till February, and got \$2.25 per barrel while ordinary apples were a drug in the market.

I doubt not many will say that these are exceptional cases and will not apply to us. I must answer that no one can furnish capacity. The same opportunity awaits all alike. In this pushing, rushing age only a few in any calling will become eminently successful. You can count the Astors, Vanderbilts, and Goulds of this country upon your fingers. But successful men are numerous in all gradations. As I have before remarked, success depends upon the man rather than the business. This is as true in agriculture as in any other occupation. We must divest ourselves of the idea that a recipe can be given which will bring wealth to all who follow its directions. We can all learn something from the successes and failures of others but our own individuality must carve out success.

Select your specialty, learn your business, push it with energy, industry, skill, and perseverance, and you will succeed

as those in other kinds of business prosper. We have seen what sort of citizens the farmers were who first settled this State. While our circumstances are radically different from theirs, their principles may well be taken as the pattern and guide of the farmers of to-day who are not only their successors but in many cases their lineal descendants. They made the good of the whole paramount to the good of the individual. Then the farmers were the State; now they are only a minority in all of the older States, but from their households come the men of influence who will shape the policy of the future in government, in professional life, in commerce, and in manufactures.

The successful men of to-day were the farmer boys of a few years since. Consequently, almost as large a responsibility devolves upon us farmers to-day as did upon our predecessors of two hundred years ago.

We have the early training of the future leaders of the nation. Statistics show that at least eighty per cent of the successful men in all callings were born on the farm or in the country. This seems to be the natural law. The country is the fountain from which the city draws its fresh blood to take the place of that worn out or deteriorated in the heated scramble for wealth and position. This is true of Massachusetts cities and New Hampshire towns. They must have this fresh vital force to save them from disaster. As they increase in population with wondrous strides they attract the worst as well as the best elements of society. The foreign population naturally settles in the cities. Nearly forty per cent of our German and more than forty-five per cent of our Irish population is found in fifty of the principal cities. A little less than one third of our population is foreign by birth or parentage. But sixty-three per cent of the population of Boston, eighty-eight per cent of that of New York, and ninety-six per cent of that of Chicago is of foreign birth or parentage.

The power of the saloon, of socialism, and of all other bad isms is in the cities. Here, dangerous men, the ignorant, the wicked congregate. Those with enormous wealth and

the poorest of the poor. Here we find the aristocratic quarter with streets lined with the palaces of the millionaire, and the wards where thousands of the ignorant and depraved poor are crowded into a single square of dirty tenements. A New York judge not long since said, "There is a large class, I was about to say a majority, of the population of New York and Brooklyn who just live, and to whom the raising of two or more children means inevitably a boy for the penitentiary and a girl for the brothel." These classes are a menace to good government. Almost every man of them is a voter and they have also among them a class of unscrupulous politicians who by their influence control the voters and carry whole wards in their pockets. They live off of politics. Their hold is through the saloons and other disreputable places. The farm and country village must furnish the material to control or neutralize this taint and stay the power of this avalanche of destruction. This growth of the cities is to continue. Here lies the duty and the opportunity of the farmer to do the work of the good citizen. In his home must be trained the men and women who will hold the future destinies of this great republic. Let no narrow, selfish views control our action. Let the disinterested patriotism of our ancestors be our pattern and guide. Our duty is to the whole body politic. The influence of the Pilgrims and Puritans made the New England States what they are in education, morality, and business prosperity, and no where do their characteristics yet remain so nearly in their original purity as in the towns of New England. Our ancestors were quick to repel invasion of their rights by their French and Dutch neighbors, and to rebel against unfair and oppressive taxes levied by the king and parliament of Great Britain. They were ready to risk life and to sacrifice property for the right. So we should stand firmly for our rights as agriculturists demanding fair play and the same fostering care of our industry that is granted to other branches of business, remembering to require not only justice for ourselves but for all, whether rich or poor, professional men, producer or con-

sumer, merchant or customer, manufacturer or operative. Our business is an honest business and we should not require special favors for ourselves at the expense of others but should peremptorily demand fair play. Our quiet life and rural situation has led the bustling and pushing masses of the cities to overlook our interests. The ease with which they are enabled to obtain the needed supply of agricultural products at low prices has led these same people to forget in some measure the obligation of the state and nation to the rural population. Let us see to it that we are not overlooked in the future. While legislation cannot make crops grow nor prices appreciate, it can in many ways, indirectly, help agriculture. It is but just that every man should be compelled to bear his fair share of the burdens of government. The escape of credit property from taxation or its being taxed at a less rate than real or visible personal property, the under-valuation of city and village property, the over-valuation of farm property, are grievances that should be remedied, and farmers are bound to take all legal measures to right the wrong. It is possible that it would be best to go further and tax incomes. The man whose skill or natural faculty enables him to earn \$3,000 per year can better afford a tax on \$3,000 than the owner of \$3,000 worth of real estate. Farmers have a vital interest in these matters, not as farmers but as citizens, just such an interest as every man has who rents or owns a home or manufactory. The farmer has a right to legal protection from unfair competition by imitation of his products and should insist upon it. But the consumer has a right to be protected from having the imitation palmed off on him as genuine. The manufacture and sale of adulterated or imitation products as pure and genuine is in all cases a swindle, and the farmer should be prompt to exert his influence and cast his vote for honesty in business, not only for his own protection but because it is right and honest. It is true that a State cannot be permanently prosperous without a prosperous agriculture and a thriving rural population, and it behooves the people of manufacturing and commercial centres

to foster agriculture. But it no less behooves the farmers to see to it that full justice is accorded to the merchant, the manufacturer, the professional man, and the wage earner. The farmer should be to all intents and purposes a good citizen, earnest for the good of the nation, his state, and his town. To this end he should be well informed on all matters of politics, should attend the primary political meetings of his party and should never fail of his duty at the polls. He should insist on economy in the appropriation and expenditure of public money. But he should remember that economy is not stinginess but the judicious expenditure of money. He should remember, that good schools are vital to the future welfare of the State, that money judiciously expended for good roads is a first-class investment for every community, and that a low rate of taxation is not always to be struggled for. The farmers living on and owning the land always form the conservative force of a community. They should stand between the schemes of labor cranks and the greed of labor employers, and see that strict justice is meted out to all by laws properly restraining the ill-considered or greedy schemes of all classes. The corporation, properly managed and restrained, is a useful adjunct to the business of the country and should have justice at our hands, but their plans being the schemes of soulless bodies should be carefully scanned and the legislation asked for should be closely investigated.

The New Hampshire system of representation by towns in the Legislature gives the farmers larger opportunities and greater responsibilities in matters of legislation than the farmers of many other States can have. See to it, my friends, that you discharge your political duties so that your fellow citizens who dwell in the centres of population shall have no cause to charge ignorance, bigotry, intemperance or class legislation to the rural population of New Hampshire. The farmer should have malice towards none but should insist on exact justice to all; should deal with public questions in the same spirit that actuated the fathers of this good old commonwealth. Thus, and thus only, can we retain the respect

and coöperation of those in other callings in our schemes for our own advancement and for the public good.

MR. CURTIS: According to that, the waste product would pay to keep a cow?

MR. SESSIONS: Yes, sir, where hay is not worth any more than it is in rural districts that is true. But if you pin a man down and ask him how it can be made profitable, my answer would be that I cannot give a man brains to get that out of it. There is a way to do it in my opinion. At any rate you must have the waste product if you intend to keep up your farm and continue to use it. If your idea is merely to sell your farm little by little, you would have no use for the manure, perhaps.

MR. PHILBRICK: We are told that it is impossible to get only a certain per cent of the value of this waste product.

MR. SESSIONS: I think with the proper appliances we can.

QUESTION: How much money did he have when he started?

MR. SESSIONS: He paid for the whole thing. He didn't have any capital to start with except his own hands.

THE PRESIDENT: The next subject will be "Our New Hampshire Forests" by Hon. Joseph B. Walker, who will now address you upon that subject.

OUR NEW HAMPSHIRE FORESTS.

BY HON. J. B. WALKER, CONCORD, N. H.

New Hampshire has four principal natural resources:

1. Her Soil.
2. Her Water-Power.
3. Her Invigorating Climate and Scenery.
4. Her Forests.

Just in proportion as she wisely develops these, she increases her wealth and enhances her importance in the sisterhood of American States. The talk assigned to this hour is to be upon our forests; and wisely, for of these and of their proper management there is less known and said than of our soil, our water-power, or our scenery.

OUR FOREST AREA.

I took particular pains, some six years ago, to ascertain the existing forest area of this State. From a careful study of the census returns of 1880, I reached the conclusion that something over one half (nearly fifty-nine per cent) of its entire surface was in forest. And if we look back, we shall also find that this proportion has never been much, if any, less.

This fact, as important as it may be imposing, very naturally raises the question, How happens it that the people of New Hampshire have, for so long time, left so much of their State in its natural wildness and reduced so small a portion of it to cultivation? The answer is easily found. It has been impossible for them to do otherwise than as they have done. The rugged sides of our mountains and the bowlder strewn surfaces of very many of our lesser elevations have never submitted to any plow but that of the glacier or the avalanche, and, in all probability, never will. Agriculture, in the future as in the past, must be restricted to our valleys and to the smoother surfaces of our hills. Of the nearly six millions of acres which comprise our State's area, less than one million are in tillage and only a million and a quarter in pasture. Some three and a half millions are in forest. And strange, perhaps, to say, for the last few decades our wooded area has been increasing. Wherever one goes, he will see repeated evidences of this fact.*

If now, any one shall ask, "What do these striking facts mean?" I can simply but confidently say, that they mean that the Supreme Maker of New Hampshire has intended the larger portion of it for the perpetual growth of wood and timber, and that it is financially impracticable to devote this to any other purpose. To attempt it is simply to contend with the Almighty. It becomes us, therefore, to accept the situation. By so doing we shall not only follow our destiny but attain to our highest prosperity.

*It must not be forgotten that, although our forest area is constantly increasing, our timber supply is very fast decreasing. Much of our present forest land will not be in fit condition for the axe for twenty years at least.

INDUSTRIAL PURSUITS DETERMINED BY GEOLOGY.

Geology largely determines the industrial pursuits of a people. An examination of the different sections of the United States where unlike occupations prevail, incontrovertibly establishes this proposition. Great iron industries have been founded in Pennsylvania, and other States of like geological character, because great deposits of coal and iron have attracted them. Cotton culture is found in what is known as the cotton belt because the soil and climate favor its presence there. Similar statements apply to the corn and other areas, which together constitute so much of our national domain. The New England States are alike in many respects, geologically, and hence their industries are greatly similar. The great drift formations, almost everywhere present in this State, have made wood and timber the great staple of New Hampshire. This is geologic destiny and we can resist only to our hurt.

LUMBERING ONE OF OUR EARLIEST INDUSTRIES.

Next to a limited traffic with the Indians, and to fishing, lumbering was the earliest industry established in this State. At the time of its settlement, its whole face was hidden by primeval forests, broken only by limited water areas and an occasional mountain summit towering in rocky barrenness above the reach of arboreal vegetation.

As population crept by degrees up the banks of the Piscataqua and its branches, much of it sought employment by converting the stately trees which lined them into timber, boards, plank, pipe-staves, and ships. The latter, freighted with fish and forest products, were quite often sent to the West Indies, where more or less of their cargoes were exchanged for the products of those islands, and thence to Europe, where both vessels and cargoes were sold. With the proceeds of these, New Hampshire merchants paid for the imports with which they supplied the wants of the home population.

Twenty-one of the thirty-six products of New Hampshire exported to foreign countries ten years before the close of the last century, were those of the forest, as appears from the following—

“Table of Exportation of lumber from the Port of Pascataqua, from October 1, 1789, to October 1, 1791.”

ARTICLES EXPORTED.	To Europe.	W. Ind.	N. Seo.	Africa.	Tot.
1,000 feet of Pine Boards.....	6,247	11,622	96	69	18,034
Do. feet of Oak Plank.....	378	26			404
Do. Staves and Heading.....	1,317	1,608	44		2,969
Do. Clapboards.....	2	19			21
Do. Shingles.....	2,689				2,689
Do. Hoops.....		79 ⁴	7		86 ¹ / ₄
Feet of oar rafters.....	47,000	950			47,950
Tons of pine timber.....	88 ¹ / ₂	86			174 ¹ / ₂
Do. oak timber.....	251	20			271
Frames of houses.....		12			12
Pine masts.....	41	4			45
Spruce spars.....	13	72			85
Shook hogsheads.....		2,079			2,079
Waggons.....		2			2
Pairs of cart wheels.....		14			14
Sets of yokes and bows.....		28			28
Boats.....		30			30
Handspikes.....	80				80
Quintals of dry fish.....	250	26,207			26,457
Barrels of pickled fish.....		501			501
Do. whale oil.....		120			120
Do. tar.....	1,613	60			1,673
Casks of flax seed.....	1,798	2,775	1		1,798
Barrels of beef.....		2,775	2		2,777
Do. pork.....		9	1		10
Do. rice.....				2	2
Bushels of Indian corn.....		391		2,000	2,391
Oxen and cows.....		577	33		610
Horses.....		207	2		209
Sheep.....		261	229		496
Gallons of New England rum.....			150	1,449	1,599
Do. Madeira wine.....		845			845
Thousands of bricks.....		129			129
Tons of potash.....	88 ¹ / ₂				88 ¹ / ₂
Do. pearl ash.....	30 ¹ / ₂				30 ¹ / ₂
Boxes of candles.....		28			28

Total value of exportation for two years, 296,839 dollars, 51 cents.”

Belknap's Hist. N. H., vol. 3, p. 219.

The following table of the imports at Pascataqua (Portsmouth) for the same time, gives a fair idea of the articles received in return for those set forth above :

"ARTICLES IMPORTED FROM EUROPE.	W. Indies.	Nova Scotia.	Total.
Gallons of rum.....	138,911	.....	138,911
Ditto gin.....	221½	.....	221½
Ditto molasses.....	270,785	.....	270,785
Ditto wine from Madeira.....	.....	.....	4,721
Ditto porter.....	457	.....	457
Lbs. of unrefined sugar.....	546,648	.....	546,648
Ditto loaf sugar.....	.....	77	77
Ditto coffee.....	68,633	.....	68,633
Ditto cotton.....	17,564	.....	17,564
Ditto cocoa.....	27,944	.....	27,944
Ditto cheese.....	1,056	.....	1,056
Ditto tea.....	2,696	86	2,782
Ditto twine.....	2,204	.....	2,204
Ditto nails.....	16,890	.....	16,890
Hundreds of cordage.....	17.67	.....	17.67
Ditto hemp.....	940.00	.....	940.00
Bushels of salt.....	(part)	(part)	98,336
Ditto sea coal.....	3,131	.....	3,131
Lbs. of steel unwrought.....	16,527	.....	16,527
Ditto bar and sheet lead.....	4,336	.....	4,336
Grindstones.....	.....	A few, not ascer- tained."	.....

Belknap's Hist. N. Hamp., vol. 3, p. 220.

For a century and a half the people of New Hampshire relied upon these two industries, supplemented by that of a slowly growing agriculture, for their support. Nor was the value of the forest then appreciated by those only who were thus dependent upon it. The king quite early learned the fitness of its stately pines for masts and spars for his royal navy and claimed them for his own.* To make sure of them, he appointed officers whose duty it was to affix to all such trees, not previously sold, the mark of the broad arrow, in token of their reservation for this purpose

*Dr. Belknap said, in 1792, that, "The white pine of the forest is the strongest and most durable timber which America affords for masts. It is often advanced by Europeans, that the pines of Norway exceed those of America in strength. This is acknowledged to be true whilst the Norway wood retains its natural juices; but these being soon exhausted by the heat and dryness of the air, leave the wood less firm, and a decay commences much sooner than in the white pine of America. The Norway pine begins to decay in five or six years; but the American, with proper care to defend the mast head from moisture, will last unimpaired for twenty years."

"The British navy for eighty years before the late war, received its masts wholly from America; which is a proof that our pines are preferable to those of Norway."

Belknap's Hist. N. Hamp., vol. 3, p. 210.

and of the severe penalties attaching to an unauthorized cutting of them. Parliament and the provincial assembly both enacted laws for the protection of the forests. On the 10th day of May, 1708, the general assembly imposed a fine of one hundred pounds sterling upon any person "who shall presume to cut or destroy any white pine trees, or mast trees, not being the particular property of any private person, above the growth of twenty-four inches in diameter at twelve inches from the earth, being fit to make masts for her majesty's royal navy."

The cutting of more than one box or notch in a pitch pine tree,* for the collection of pitch for the manufacture of turpentine, was forbidden by a provincial statute, and a penalty of five pounds was incurred by a violation of the same. Tar, boards, plank, pipe-staves, and other forest commodities were made receivable in payment of public taxes and the prices of the same were fixed by the general assembly.

Indeed, for many years, the most lucrative public office in the province was that of surveyor-general of the king's woods. It was a crown office, and when Benning Wentworth was made provincial governor, he was also made surveyor-general of the forests. To the latter office was attached a salary of eight hundred pounds sterling, which much exceeded, in both security and amount, the uncertain sums tardily and reluctantly doled out to him by the general assembly, in compensation for his services as governor. To secure a resignation of this office in Wentworth's favor,

*Fifty years ago, heavy growths of pitch pine trees (*Pinus Rigida*) were to be found upon the sand formations along some of the rivers of the State. Specimens were not uncommon which compared quite favorably with the hard pines (*Pinus Australis*) of the South. But such forests have mostly disappeared. Those pine trees have been cut for timber and the inferior ones for wood, much of which has been consumed by locomotive engines.

Where forests of this wood have been removed, they have shown a disposition to return, with a similar growth; but, in many cases, particularly in the vicinity of large towns, fires have destroyed the second growth before they had attained a size sufficient to endure their ravages. This remark applies with particular force to the hard pine woods in the vicinity of Concord and Manchester. The Dark Plain, so well known to the people of the former city, half a century ago, is to be found now only in history.

its incumbent, Dunbar, was paid the large sum of two thousand pounds.

While in the early days of the province, lumbering was extensively pursued, it rarely enriched those who engaged in it. As the forests retreated and the country developed, agriculture became more and more the support of the people. Lumbering, imperfectly organized and carried on by persons possessed of inadequate means only, became less and less remunerative. As a business it was but imperfectly organized. Its returns were but moderate at best. They were also slow, except in cases where advances were made by factors and dearly paid for.*

Some who pursued lumbering also followed farming. But the two pursuits did not harmonize in their requirements. Those of the former interfered seriously with the work of the fields, and it was found, ere long, that a man could not carry on both to his greatest profit. In most cases work in the woods gave way to that of the farm; and at length, agriculture became the leading pursuit of our people.

Indeed, we may say generally that lumbering has never been a lucrative business in New Hampshire until recently, when improved facilities of transportation, systematic management, and the free use of capital have made it so.

FOREST MANAGEMENT.

How then shall we of to-day manage our forests? This is the question. All the forests of New Hampshire are now

†Dr. Belknap said, an hundred years ago, that the lumber business did not usually enrich those who pursued it; but, rather, that "Those who make the getting of lumber their principal business generally work hard for little profit. This kind of employment interferes too much with husbandry. The best season for sawing logs is the spring, when the rivers are high; this is also the time for ploughing and planting. He who works in the sawmill at that time, must buy his bread and clothing, and the hay for his cattle, with his lumber; and he generally anticipates the profit of his labor. Long credit is a disadvantage to him; and the too free indulgence in spirituous liquor, to which this class of people are much addicted, hurts their health, their morals, and their interests. They are always in debt and frequently at law. Their families are ill provided with necessities, and their children are without education or morals."

Belknap's Hist. N. Hamp., vol. 3, pp. 261 and 262.

the property of private individuals.* More easily asked than answered. Two systems of forest management which have long prevailed in this State are still in vogue. Of forestry as seen in Europe we have but little, if any, as yet. Thus far, our plantings of forest trees have been made by nature only. Hand planting has been unprofitable and unnecessary. That we may adopt it, by and by, is very possible and perhaps probable. But I doubt if the time is near. Spontaneity of seeding and the high price of labor both oppose its introduction.

* It appears by the record of three deeds in the office of the secretary of state that, the State sold all its interest in its forest lands in 1867. The conveyance was made by three different instruments.

By the first, dated October 17, 1867, for the sum of \$500, it sold "all and singular, the lands belonging to the State of New Hampshire, lying and being within a circular area six miles in diameter, of which the centre is the centre of the Tip-Top House on the summit of Mount Washington, in the County of Coös in said State, and extending three miles in any direction from the centre of said Tip-Top House, all situate in the County of Coös aforesaid, and estimated to be two thousand acres in the whole, more or less, meaning and intending hereby to transfer and assign to said Aurin M. Chase, his heirs and assigns forever, all the right, title, and interest of the State of New Hampshire in and unto any and all lands within the limits of the aforesaid circle, however the same may be located and bounded and whatever the number of acres."

By the second, dated October 27, 1867, for the sum of \$20,500, it sold "all and singular, the lands belonging to said State of New Hampshire, situate and lying within the limits of the town of Pittsburg, in the County of Coös in said State of New Hampshire, however located and bounded, estimated at seventy thousand acres, more or less, excepting and reserving, therefrom to each of two actual *bona fide* settlers now supposed to be resident upon said lands, if they or either of them shall prove to be so actually resident thereon, so much of said lands as each of said settlers or either of them may have actually improved or inclosed, not exceeding one hundred acres in all to each or either of said actual settlers."

By the third, dated November 5, 1867, for the sum of \$4,000, it sold "all and singular, the lands belonging to the State of New Hampshire or in which the said State of New Hampshire has or might have any right, title, interest, or claim in any way whatever, situate and lying within the limits of the Counties of Grafton, Carroll, and Coös in said State of New Hampshire, however located and bounded, estimated at one hundred thousand acres, more or less, meaning and intending hereby to assign and convey to said Woods and Smith, their heirs and assigns forever, all and singular the lands in said Counties of Grafton, Carroll, and Coös, to which the said State of New Hampshire has or might have any claim or title in any way whatever, excepting and reserving from said grants the arsenal lot in Lancaster, in the County of Coös, and any given house lot owned by the State in said Counties of Grafton, Carroll, and Coös, aforesaid."

If the areas as given above are correct, the State received for these lands the very inadequate sum of 14 23-43 cents per acre.

The First System.—Where wood is of value and its production is more profitable than timber, clean cutting has been practiced; sometimes at the ends of stated periods, but usually with no regularity. This course involves the denudation of the land and the removal of its entire growth. This is quite often succeeded by another of a different character, particularly if the one removed be an evergreen growth. The change is less frequent if the trees removed are of a deciduous character, as many of these, like the chestnut, the red and white maples, and some of the birches, sprout at once from the stumps of their predecessors. Hard pines also, particularly on sandy plains where deciduous trees do not flourish, are quite often followed by others of the same species. Where a spruce growth is removed it is rarely followed, if ever, by another of the same kind; a matter of no small interest to parties interested in the preservation of the great forest reservoirs of the State, upon which the manufacturing streams so largely depend for water.*

Lands possessing favorable exposures, fairly dry and of average fertility, will occasionally yield a crop of thirty or thirty-five cords of wood per acre at the end of each succeeding period of as many years. But judging from personal experience and observation, I deem such a crop above the general average, which usually does not exceed three fourths of a cord of growth per acre per annum.

This system of management is the simplest of any, and where wood is valuable, as in the vicinity of large towns, is as profitable. It involves only the cutting and marketing, at stated times, of the growths of stated sections.

*The volumes of our streams are less equable than formerly. In summer they are greatly reduced. Many brooks whose flow was once perennial are no longer to be found for one half of the year. This fact is due to the total or partial denudation of the land from which they flow. So serious an evil had this become, some thirty or forty years ago, that the manufacturing companies upon the lower part of the Merrimack, were forced to construct vast storage reservoirs, at great expense, which can be drawn upon as water is wanted. Winnepesaukee lake and Long pond are two of these. Total denudation at the source of our streams, would convert them into destructive torrents in spring and their channels into dry ditches for the rest of the year.

The Second System.—In localities where only timber is of much value, as is the case in many parts of the State, the practice has prevailed of cutting none but trees of selected varieties, and those only which were of sizes above a minimum standard. Until recently, this custom has been universal in the great lumber districts. But the introduction of portable saw mills, the extension of railroads into the woods,* other improved facilities of transportation, and a call for smaller lumber have led, in many instances, to complete denudation in very remote localities. In individual instances, this course may have best subserved the interest of the operator; but as a general thing, and particularly when that of the public is regarded, the wisdom of this practice is doubtful, to say the least, and for several reasons:

1. A denuded surface dries quickly, and, if a fire gets well started upon it, its arrest is difficult if not impossible. This sometimes destroys not only the ground's covering of leaves and other vegetable debris, but burns the underlying matting of roots and ligneous matter, which often composes the only soil of large areas, leaving bare the barren underlying rock. After such a burning, a new growth may never start, or, if it does, it will be found that portions only of the tract have been reforested. The summit of Kearsarge is said to have once been covered with trees, but it is bare now and, in all human probability, must forever remain so.†

*Some half a dozen short railroads, in the upper part of the State, have been built into the woods by lumbermen for the transportation of logs. Experience shows that in time some or all of these will be changed to general passenger and freight roads. The Whitfield and Jefferson railroad has already been converted to such a purpose. The Zealand Valley, the Sawyer River, and the Kilkenny railroads are as yet used for the transportation of lumbermen's supplies and lumber only.

†Greater injury to the forests and scenery of the State is to be apprehended from fires than from any other agency. This fact is due, in part, to the carelessness of camping parties, and in part, to a general indifference to their ravages. While the burning of a building, worth an hundred dollars, will at once engage their attention and bring together all persons in its vicinity, the destruction by fire of a distant timber lot, worth ten thousand dollars, will awaken but slight interest in their minds. It is important, therefore, that the owners of such property should so manage it as to reduce its exposure to fires as much as possible; and its injury, in case of burning, to a minimum. This

If there is any sight entirely disheartening, it is that of one of these fire denuded tracts, from which everything has been swept clean, down to the underlying rocks. Any one who has visited the Zealand valley within the last five years can attest the truth of this assertion. For seven miles up the valley, the fire swept resistless across it from crest line to crest line of the mountains which wall it in. Neither bird, nor beast, nor man, nor tree could endure its arid breath and devouring flame. The river only and the naked ledges, with a few small sections too damp to burn, escaped destruction. As one now looks upon the two towering sentinels of fire-blasted rock which mark the opening of this valley, there blazes into his mind, in letters of living fire, the terrible inscription which Dante in his Divine Comedy placed over the entrance arch to hell, —

“All hope abandon ye who enter here.”

2. In case a denuded tract escapes the fire and a new growth springs up from accidental seedlings or from the stumps of trees removed, many years must elapse before it has matured and is ready for the axe. How many, will of course depend upon the character of the soil, its exposure, and the variety of lumber sought. No paying crops of timber, however, can be harvested in such localities until the expiration of some forty or fifty years.*

can be best accomplished by keeping woodlands free of debris, and by dividing them into sections by roads or ditches; which, if kept open, will often confine any fires which may have been kindled to limited areas.

*Some persons may maintain that timber grows faster than I have indicated. The statement in the text is based, partly upon general observation, and partly upon actual measurements of fallen trees and counts of their annual rings of increase. As an instance of such measurements and enumerations, I cite the diameters, number of annual rings and average annual increase of forty white pine logs, twenty of chestnut, twenty of red oak, and five of hemlock, all of which grew upon lands in the vicinity of Concord:

Forty White Pine Logs.

Diameters.	No. rings.	Average annual increase.	Diameters.	No. rings.	Average annual increase.
19 inches.	75	.25 in. per an'm.	425 inches.	1,713	5.00 in. per an'm.
22 "	72	.30 "	35 "	92	.38 "
24 "	73	.33 "	27 "	91	.30 "
20 "	82	.24 "	30 "	95	.32 "
21 "	83	.27 "	23 "	92	.25 "
19 "	89	.21 "	16 "	96	.17 "
20 "	90	.22 "	23 "	50	.46 "
19 "	80	.24 "	31 "	91	.34 "
14 "	87	.17 "	21 "	54	.40 "
25 "	90	.28 "	30 "	93	.32 "
12 "	80	.15 "	16 "	58	.24 "
22 "	93	.24 "	26 "	80	.30 "
23 "	92	.25 "	25 "	80	.30 "
22 "	91	.24 "	30 "	90	.33 "
23 "	86	.27 "	20 "	91	.22 "
27 "	90	.30 "	20 "	89	.23 "
23 "	94	.24 "	12 "	60	.20 "
30 "	86	.35 "	20 "	86	.21 "
17 "	89	.20 "	18 "	99	.18 "
23 "	91	.25 "	38 "	164	.23 "
			22 "	107	.22 "
425 inches.	1,713	5.00	908 inches.	3,471	10.60
			Av. diameters	Av. no. rings.	Av. annual increase
			22.70 in.	86.77	.265 inch.

Twenty Chestnut Logs.

Diameters.	No. rings.	Average annual increase.	Diameters.	No. rings.	Average annual increase.
18 inches.	49	.37 in. per an'm.	225 inches.	762	2.93 in. per an'm.
16 "	81	.20 "	19 "	65	.29 "
20 "	78	.26 "	16 "	70	.23 "
22 "	87	.25 "	20 "	75	.26 "
24 "	91	.26 "	23 "	93	.25 "
20 "	70	.33 "	21 "	97	.27 "
30 "	80	.38 "	17 "	64	.27 "
27 "	70	.38 "	25 "	72	.35 "
20 "	82	.24 "	25 "	71	.36 "
19 "	74	.26 "	14 "	61	.21 "
			23 "	70	.30 "
225 inches.	762	2.93	428 inches.	1,480	5.72
			Av. diameters	Av. no. rings.	Av. annual increase
			21.41 inches.	74.	.286 inch.

Twenty Red Oak Logs.

Diameters.	No. rings.	Average annual increase.	Diameters.	No. rings.	Average annual increase.
36 inches.	64	.56 in. per an'm.	176 inches.	753	2.52 in. per an'm.
25 "	69	.36 "	13 "	58	.19 "
11 "	35	.31 "	26 "	62	.42 "
18 "	115	.16 "	15 "	60	.25 "
16 "	110	.15 "	15 "	79	.19 "
13 "	100	.13 "	18 "	59	.30 "
19 "	65	.29 "	14 "	55	.25 "
11 "	61	.16 "	15 "	80	.19 "
12 "	70	.17 "	36 "	73	.48 "
15 "	64	.23 "	21 "	63	.33 "
			15 "	60	.25 "
176 inches.	753	2.52	364 inches.	1,402	5.37
			Av. diameters 18 inches.	Av. no. rings 70	Av. annual increase .27 inch.

Five Hemlock Logs.

Diameters.	No. rings.	Average annual increase.	Diameters.	No. rings.	Average annual increase.
24 inches.	68	.36 in. per an'm.	55 inches.	195	.85 in. per an'm.
17 "	74	.23 "	13 "	53	.24 "
14 "	53	.26 "	18 "	140	.13 "
		
55 inches.	195	.85	86 inches.	388	1.22
			Av. diameters 17.20 in.	Av. no. rings 77.60	Av. annual increase .24 inch.

When the cutting is restricted to trees above a minimum diameter of ten or twelve inches, a small number only of the standing trees are removed; the soil continues shaded and moist; if fires are started, they are more easily extinguished; and although the remaining trees may be immature, they represent growths of from one to twenty or thirty years; for a new crop of which there must be waiting in case of entire denudation. A tree of the size of a goad stick measures little and is of slight value. But it has taken half a dozen years to produce it. It is the predecessor of a larger one, which, without this start, would never be, just as the boy precedes the youth, and the youth the man. The first sys-

tem disregards this fact, wastes the introductory growth of several or even many years, for slight consideration, and starts anew on an unoccupied surface. The second, husbands with care all immature trees, removing only those which are ripe, and starting anew every twenty or thirty years with a crop half grown; just as the orange grower picks his mature fruit and waits patiently for that which is green to turn yellow.

A gentleman, who has had a long and extensive experience in lumbering upon the head waters of this State, recently told me that he pursued restricted cutting and realized a timber crop every twenty years.

Another, who has long pursued the same system in the town of Chatham, remarked some time since, that a certain addition to his timber lands which he thought of making, would enable him and his successors to cut upon their own land a million feet of logs annually and perpetually, inasmuch as his standing timber would grow that much every year. In neither case, could this be done under the system first mentioned.

Which of these two systems is to be preferred, I have, perhaps, already sufficiently indicated. The latter will probably be adopted when systematic management becomes general, for the value of wood is little likely to increase and timber culture only to be profitable.

The following calculation,* based upon the annual re-

*This calculation is but one of a score which might be cited as examples to show the profits to be derived from a well managed wood and timber lot. Results will vary much with the character and exposure of the grounds, the trees raised and the treatment which they receive.

Plantations of small timber, particularly of white pine, cut or thinned at intervals of from twenty to twenty-five years will show better returns than natural seedlings of promiscuous trees. It is now easy to sell at good prices small timber for which there was formerly no demand. Indeed, it is doubtful if it be longer advisable to raise large trees, which attain maturity only at the end of periods of seventy or eighty years. Greater profit comes to the owner of a timber lot from cutting smaller quantities of timber, at the end of shorter periods, than he has been wont to do. By this practice the trees are oftener thinned, the sunlight and air is more freely admitted among them, and their growth is accelerated. When we come to the practice of systematic forestry and assign to individual trees regulated spaces, as we do to our cornstalks, we shall find their growth hastened some twenty-five per cent.

moval from four-acre sections, and its sale for \$8 per thousand, of six and a quarter thousand feet of lumber per acre, from a timber lot of one hundred and forty acres, for a period of thirty-five years, at the expiration of which the entire lot will have been cut over, shows some interesting results.

The aggregate sales of \$200 per year, without interest, amount at the end of this period, as is readily apparent, to \$7,500.00. If the several amounts of the annual sales have been invested at five per cent interest, and left undisturbed, to accumulate, they will be found at the end of each year of this period to be as follows:

35th year's cutting, \$200 and 5 pr. ct. int. for 1 year=	\$210.00	
34th " "	2 " = 221.50	
33d " "	3 " = 231.53	
32d " "	4 " = 243.11	
31st " "	5 " = 255.27	
	<hr/>	\$1,160.41
30th " "	6 " = \$268.03	
29th " "	7 " = 281.43	
28th " "	8 " = 295.50	
27th " "	9 " = 310.28	
26th " "	10 " = 325.79	
	<hr/>	\$1,481.03
25th " "	11 " = \$342.08	
24th " "	12 " = 359.18	
23d " "	13 " = 377.14	
22d " "	14 " = 396.00	
21st " "	15 " = 415.80	
	<hr/>	\$1,890.20
20th " "	16 " = \$436.59	
19th " "	17 " = 458.42	
18th " "	18 " = 481.34	
17th " "	19 " = 505.40	
16th " "	20 " = 530.67	
	<hr/>	\$2,412.42
15th " "	21 " = \$557.20	
14th " "	22 " = 584.06	
13th " "	23 " = 613.43	
12th " "	24 " = 644.10	
11th " "	25 " = 676.31	
	<hr/>	\$3,075.10

10th years' cutting, \$200 and 5 pr.ct. int. for 26 years—\$710.13			
9th	"	"	27 " = 745.64
8th	"	"	28 " = 782.92
7th	"	"	29 " = 822.07
6th	"	"	30 " = 863.17
			—————\$3,923.93
5th	"	"	31 " = \$906.33
4th	"	"	32 " = 951.65
3d	"	"	33 " = 999.23
2d	"	"	34 " = 1,099.19
1st	"	"	35 " = 1,160.41
			—————\$4,116.81

Amount of an. cuttings and int. at the end of 35 years \$18,059.90

If these several amounts be condensed at the end of each successive period of five years they will foot up as follows :

At the end of five years to	.	.	.	\$1,160.41
At the end of ten years to	.	.	.	2,641.44
At the end of fifteen years to	.	.	.	4,531.64
At the end of twenty years to	.	.	.	6,944.06
At the end of twenty-five years to	.	.	.	10,019.16
At the end of thirty years to	.	.	.	13,943.09
At the end of thirty-five years to	.	.	.	18,059.90

Should the proprietor be so situated as to require for use, from time to time, portions of these accumulations, the remainder will still increase by yearly additions and by annual interest ; while, at the same time, his standing timber is also increasing by annual deposits of new wood. If for instance, he should see fit, at the end of twenty years, to withdraw from these accumulations a thousand dollars, and at the end of twenty-five another, and five years later another still, he will find at the close of the supposed period of thirty-five years, that he has still to his credit the snug sum of \$13,069.00.

A PORTION OF EVERY FARM SHOULD BE IN FOREST.

In the old-time notices of farms for sale, this phrase, immediately following the number of acres offered, "suitably

divided into tillage, pasture, and woodland," was very common if not universal. Every farm was then supposed to possess a "suitable" area of wood and timber. If one was without this, it furnished an exception to the general rule. But times have changed and the converse is now too often true. The remaining forests in many of our towns are in a disordered condition and strangers to all systems of management but that of caprice and neglect. In the older parts of the State the amount of standing timber has been fearfully diminished. Hundreds and thousands of valuable timber lots have been thoughtlessly sold by their owners, and immediately afterwards stripped of their growths by their purchasers. By this means, the real estate valuations of towns have often been materially reduced.*

It is often a matter of surprise that a careful farmer, who is unwilling to sell a neighbor a bushel of corn worth seventy-five cents, except after careful and streaked measurement, is willing to sell a speculator, of whom he often knows very little, his entire timber lot, his inheritance, perhaps, from more prudent ancestors and worth thousands of dollars, and to fix the price by guess. And when he has sold it and received his pay for it, he wonders what he shall do with the money, and is led, perhaps, to be cheated a second time in the purchase of high interest promising mortgages on farms poorer than his own, in the arid regions of Western Kansas or Nebraska, brought to his notice by some peripatetic bond pedlar.

The ordinary farmer needs a wood and timber lot as much as he needs pasture and tillage lands, as much as he needs cattle and farm buildings. He cannot be a first-class farmer without it, he cannot have full winter occupation in such a climate as ours. Has it ever occurred to you that the average farmer of New Hampshire is attempting to get a living

*Other considerations than a desire to realize the value of standing timber have, in many cases, led to its removal. In the vicinity of large towns, owners have sometimes been induced to cut it by the fear of fires often carelessly or willfully set. As this kind of property has diminished in quantity, exaggerated ideas of its value has, at times, led to a taxation of it which its owners have deemed excessive, and, to avoid this, they have sold it.

and a competency by less work than is expended in their various avocations by the other members of the community in which he lives? How many of us get in full days' works from the time the ground freezes in the fall until the frost leaves it in the spring? How many of us do much more than tend our stock, get up and manufacture for home use a year's supply of wood, and help break out the roads of our highway districts now and then? And yet, there are no less than one hundred and twenty-nine secular days between the 15th of November and the 15th of April, when the sun is ten full hours or more above the horizon. Forty-one per cent of all the working days in the year lie inside those two dates. It is taking us too long to get rested after our fall plowings. The seats of our pantaloons wear out faster in winter than their knees do. It becomes us to brace up.

Somehow or other, in the industrial world, returns are very largely dependent upon hours of labor. The rules of political economy may be vigorous, but they are generally fair. Indeed, the man who works two thirds of the time, has no right to claim as much compensation as he who works a third more. If he does he will rarely get it. The manufacturer runs his mill every day. So does the trader his store. The professional man and the mechanic do not discontinue their labors in winter. The farmer alone, like the bear and the woodchuck, dens up in winter and mainly because he has little to do. In other words, he has organized for himself no work for that season. To your interrogative surprise that he should lie still so much of the time, he complacently replies, what can a farmer do when the ground lies frozen two feet below the surface of the snow? To this inquiry there is usually but one answer, "put for the woods!"

Until we have organized for ourselves regular winter occupation, we have no right to expect full success in farming. To do so, is to ignore the industrial law which everywhere prevails, and to which all occupations are alike amenable, the law that return is in proportion to outlay. And when cold weather occupation can so easily be found in the woods,

it becomes us to have upon our farms due proportions of forest and to give attention to their systematic management. Their returns may be made as sure as the revolution of the seasons, our whole time will be profitably employed and our axes will ring in harmony with the click of the artisan's hammer and the splash of the miller's wheel.

Walter Scott used to say, that a walk of a mile or two before breakfast was a good thing, and best if it was over one's own land. I know of no walk more agreeable than a winter one through a well kept timber lot, particularly if it be one's own and owes its thrift largely to his instrumentality. And it will be all the better if taken daily for a considerable period in company with sleek-haired cattle and comely horses. The shouts of teamsters and the crackle of broken snow crusts are inspiring sounds in the clear, frosty air, while the solemn sighing of the winds through the columns and beneath the arches of nature's great temple makes grander music than any which rolls beneath the dim vaults of old cathedrals, dun with the stains of centuries, and redolent of associations of a remote past.

OUR ANNUAL FOREST CROP.

I have been unable to obtain as full statistics of the annual forest crop of this State as I have desired. My main reliance has been upon the United States census returns of 1880, which are now eleven years old and less complete than I wish they were. But they are better than any which have preceded them, and, let us hope, to be surpassed in all respects by those we are now so impatiently awaiting.

According to the returns of 1880, the most important statistics of the lumbering interest were :

Amount of capital invested	\$3,745,790
Value of the logs of that year	2,159,461

The maximum number of hands employed at any one time during the year ending May 31, 1880, was four thousand one hundred and sixty-five.

The amount of wages paid during the year was \$548,556.
The products of this year were :

Lumber, board measure	292,267,000 feet
Spool and bobbin stock	3,072,000 feet
Number of laths	49,454,000
Number of shingles . , . .	67,086,000
Number of staves	31,354,000
Number of sets of headings . . .	3,491,000
Value of all other products	\$58,612
Total value of all forest products	3,842,012

From this statement it appears that the total value of our lumber products during the year above mentioned, was nearly one third as much as the value of our primary agricultural products (\$13,035,250.76). The rank of New Hampshire, in 1880, among forty-nine other States and territories, as a lumber producing State was among the first third of its associates, being in importance the fifteenth.

If to the total value of the products above mentioned, there be added that of wood used for domestic purposes, estimated at 567,719 cords and valued at nearly two millions of dollars (\$1,964,669), we shall have a total of nearly six millions of dollars (\$5,806,681), and that without including the wood exported from the State, or used by its railroads, brick yards, and manufacturing establishments.

It would be hard to estimate the present value of our forests, for the want of sufficient data upon which to base a reliable calculation. The annual value of their products, as just now cited, embraces more or less of labor, the elimination of which, owing to a want of exact knowledge as to its amount and value, is a matter of great difficulty. If, however, we place their net returns at four millions of dollars and capitalize them upon a five per cent basis, we shall be constrained to appraise them at one hundred millions of dollars—an amount nearly twice that of the entire capital employed in our manufacturing establishments ten years ago.

But however uncertain their exact value may be, it is enough, under any method of reckoning, to give them high rank among the leading natural resources of our State.

FORESTRY OF THE FARM.

But it is to the importance of forestry as a part of our farm work that I desire especially to call your attention. I am satisfied that we have erred in the management, or rather non-management, of our wood and timber lands. From many farms they have disappeared almost entirely. With them has gone much of former winter occupation, and with it the income which came therefrom. If we would attain to highest agricultural prosperity, we must invite them back again, thereby enhancing the beauty of our farms and the value of our estates.

During the last twenty or thirty years, the agriculture of New Hampshire, and indeed of all New England, has made great progress on several important lines.

Cattle husbandry is now understood as it has never been before. Fine herds of the different breeds may be found in all considerable sections of the State.

Dairying has been extensively and diligently studied by enterprising persons of acute minds. As a result, its products have been improved in quality and the business has been made a success.

Notwithstanding the roughness of many of our fields, the scythe has largely given place to the mowing machine, the spreading fork to the tedder, and the hand-rake to the horse-rake. The old wooden mould-board plough, made by guess, has become an object of antiquarian curiosity; supplanted by ploughs of cast iron, which have gone through numberless improvements, it is now represented in the field by those of steel or chilled iron, constructed upon scientific principles, whereby the least amount of power is required to do a given amount of work. Similar remarks apply as well to most of the implements in use upon the farm.

We are also giving more intelligent fertilization and better

culture to all of our arable fields, whereby their productive-ness is increased. As a consequence, good farmers are raising better crops and making more money, than their predecessors were wont to do. Notwithstanding the high price of hired labor and its unreliableness, the attachment of brute power to well devised machinery has in a large measure overcome these hindrances and bids fair, in the end, to surmount them altogether.

Indeed, there is every reason to suppose that when the husbandmen of New Hampshire shall rise to a determination to apply as much intelligence, perseverance, and skill to the requirements of their work, as do the mechanics, manufacturers, and traders to theirs, their association will become as remunerative.

On one line of their business, however, the farmers of to-day have exercised less care and been more wasteful than were their fathers. On most farms, forty years ago, was found a wood and timber lot bearing fair proportions to their importance. But where now are these? The farm which is "suitably divided into tillage, pasture, and woodland," is the exception rather than the rule all over the lower part of the State and over much of its upper part.

If we mistake not, the next line of our agricultural depature, should be that of an improved forestry. Forestry should be a part of farm work and to it should be devoted more or less of the one hundred and twenty-nine days already alluded to, for which too many of us have too little to show. And when I speak of forestry, I mean a treatment of our woods as intelligent and systematic as we bestow upon the arable portions of our farms. This may require study and perseverance, persistently pursued, year after year. But it will be repaid over and over again by an enlarged income and the broadened intelligence of every person who thus rises to the plane of his opportunities.

And, fortunately, we can turn to the consideration of this subject with pleasant anticipations, encouraged by the fact that the errors of the past are not irremediable. While we

have denuded too many of our wood lots thoughtlessly and foolishly to our injury—very much as an improvident farmer cheats himself by half starving his cattle in winter and helps perpetuate that wretched phrase, “spring poor,” but knows the while, that the early feed of the pastures will restore soundness of form to the kine—we know that time and good management will make thrifty our neglected woodlands. He has been cruel and foolish. We who may have mismanaged a wooded inheritance have been simply foolish. But to blunder knowingly is almost equivalent to a crime.

The time is not distant, and in fact now is, when landed estates will be sought within our borders by persons from without; many of whom possessed of large capital, desire to spend a part of their time each year in the country. There is something in the old English nature of the New Englander, unextinguished by time or town life, which makes him seek a rural abode, just as instinctively, as a duck takes to water. As soon as a competency permits, he seeks a home in the midst of acres which he can call his own. Of the hundreds of thousands who come to us every year for sojourns of different periods, more and more are acquiring land and houses for their summer occupancy.

Some of these estates already acquired are extensive and remind one of similar homes in the old world beyond the Atlantic. The Corbin park of twenty-one thousand acres; the Shaw park in Carroll, of some four hundred; the Hutchins farm of some six or seven hundred, on Governor’s island in Lake Winnebepesaukee; and that of Mr. Hay on the shore of Sunapee lake are samples of the more important of these estates. Others less extensive, scattered everywhere are becoming more and more numerous every year. Within the last two years, some three hundred of our thirteen hundred abandoned farms have been re-occupied by summer residents as summer homes.

Wherever such persons come and improve their purchases, they enhance the value of adjoining property, and increase the valuations of their localities. They also bring to quiet

neighborhoods much of the spirit of the active communities from whence they come. With them come also intelligence, refinement, and attractive social life. Wherever one such family makes its home, it is likely, sooner or later, to attract others and cause a demand for adjoining estates which may chance to be for sale.

But persons who purchase grounds of considerable extent desire forests as well as open fields. Inasmuch as it is easy to transform a thrifty piece of woodland into a pleasing park in a few years' time, land of this kind is often a *sine qua non* in a proposed purchase. In fact, one of the leading charms of New Hampshire scenery are its forests.

It therefore becomes every farmer to keep in good condition his wooded area. This renders his farm more desirable, if at any time he desires to sell it. It will pay him a surer profit than his grain or grass fields if he chooses to keep it. It requires neither ploughing nor planting. Its increase is the gift of God. It grows while its owner is sleeping.

Thus, Mr. President and gentlemen, imperfectly, indeed, but as best I could, I have spoken of our forest area, determined largely by the configuration of the States' surface; of our lumbering, an industry imposed upon us by geological necessities; of the possible profits and the management of our woodlands; of the forest crop of 1879; of the demand for forest property by persons coming to reside with us, for a part or the whole of the year and of the very great importance of bringing forestry into the common round of farm work.

This last proposition I desire to emphasize, for I am convinced, both by my own personal experience and by observation that the reckless treatment of our woodlands has greatly impaired the value of our estates and injured more or less the beauty of the scenery around us, and that we have reached a stage of social development when this has a cash value and will bring cash in the market.

But although we have gone on blindly and made mistakes on this line, Nature, kindly forgiving, will soon reclothe these

mutilated areas if we will but allow her to do so. Let us then, not only accord to her that permission, but, in every possible way, aid her in her beneficent effort.

PROF. BREWER: A number of years ago I paid a good deal of attention to this matter of forestry both from the theoretical and practical side. I may say that we prepared the first land map of the country that was ever prepared. At the time of the census of 1870, General Walker, who was superintendent of that census, got up a district map of the United States, and he came to me and wanted me to take hold of the woodland part of it. He said that he would supply the agricultural portion. In making that map the county was the smallest unit used and we had to go over the statistics of every county in the United States and get the relative portion of woodland that was returned. That was the basis on which we began, and I got all the information that I could from other sources. The map was published in an atlas by congress about 1873. I became very much interested in the subject at that time.

I have not the slightest doubt but what in our older States we have got to go to planting trees. It is not yet certain what kind of trees can be planted with the best results in New England. The time will shortly come when it will be realized that it is just as important that trees should be planted and the forests looked after as that the other crops should be planted and looked after. As a matter of fact all over Europe except in England, schools of forestry were established and maintained before the schools of agriculture, and here in America we will have to give more attention to the subject than we have done. The time is coming, I haven't a shadow of doubt, when, after we have cut off the timber from our woodland instead of leaving it to grow up to bushes or instead of burning it off, we will go through and plant in those trees that we expect will be of value to us afterwards. I delivered a lecture on this matter a number of years ago. One man gave his experience in this direction. On land which was not more than five or six dollars an acre,

white pines were set out, and, as it stands in my memory, it was only thirty years afterwards that the timber on that land was sold for one hundred dollars an acre.

We have not yet determined what kinds of trees can best be set out in New England. We have not succeeded in planting oak economically, but white pine can be set out, I think, and grown with profit. It is very certain also that certain of the larches may be, although how far that is to be depended upon, we do not know. There is to-day a tremendous consumption of young trees for railroad ties. The destruction of these young trees is something enormous. In the course of time we have to correct this, and I believe the time is close at hand when we have got to do it. This is a matter of national importance, not only on account of the future necessity for timber, but also on account of the effect the cutting of these trees will have upon our water power. I do not believe the amount of woodland seriously affects the rainfall, but it does affect the flowage of the streams enormously. Of that there is no question. I tell you that it is an error to believe that the mountain denuded of timber and burned off, clothes itself again with timber. I do not know of any mountain that has been denuded of timber by the ravages of fire or the cutting of the timber that ever succeeded in clothing itself with timber—with good timber, I mean. It has been found in the Old World that such forests have had to be planted and that trees would not spring up spontaneously in the places of those that have been cut off.

Considering the large amount of money that is left here every year by tourists who come here to enjoy the scenery of your mountains and of your forests, and considering the importance of the water power of the State, it seems to me that there ought to be some form of state policy regarding the care of the woodland. I do not know of any subject which the Board of Agriculture can keep before it, or the people, that seems to be more useful for the general prosperity of the State than that one of the woodlands. I am very glad to see it brought up here in this meeting.

MR. WALKER: I want to say one word. Professor Brewer has alluded to the value of our scenery. Our scenery has a cash value. You may say that is all bosh; that is all sentimentalism. It is not. There is a cash value to our scenery. Mr. Bachelder, Secretary of the Board of Agriculture, in 1889 sent out his circulars and found that the summer boarders left in New Hampshire in 1889 five millions of dollars. Let us measure that by the corn crop. The corn crop of New Hampshire according to the last census was a million and a quarter bushels per annum and a little more. If that corn crop was put on the market and sold for one dollar a bushel,—which is twenty-five cents more than it could be sold for,—it would bring \$1,250,000, which is only a quarter of the amount that these summer boarders have left here. Now the reasons for a far-reaching policy of forest maintenance are various. In the first place we want to preserve our forests so far as we can and preserve the scenery. As Professor Brewer says, we want to preserve the mountain rivers of the State, and we cannot do that if those mountains are denuded. Look at the presidential range of mountains and the other mountains of the State. Covered with forests, as they are, they act like a great sponge which holds the excess of rainfall, it is gradually squeezed out, and we have as the result the reliable Merrimack, which at all times of the year provides our manufactories with water and yet never becomes a fierce destroyer. But if we cut the forests from these mountains and then burn the ground over with fire so that there is no vegetation left, what do you think we would have? In March and April when the snow was melting up in these mountains, we would have a tremendous torrent coming down, which would destroy everything, while during the dry season, there would be but little more than a brook. The regularity of the flow of our streams depends upon the preservation of our forests above here, and to a greater or less extent the preservation of this city depends upon that great sponge up there, which we ought to see is protected from the attacks that are being made upon it.

PROF. BREWER: Take woodland, and there is this sponge, as Mr. Walker has called it, under the trees. The snow does not melt off so fast in the spring since it is shaded by the trees, nor does the ground freeze so deeply where there are no trees. Where the trees are scattered the ground freezes and becomes hard and then when the snow melts it flows off very rapidly. The great floods of the United States bear evidence to this. The floods come from the cleared lands rather than from the forests. As the ground is frozen in these agricultural lands the whole tendency of the surplus water is to run away in torrents. Now of all the water that falls in rain or snow, about five eighths flow away in the streams and about three eighths evaporate from the forests and soil. Now, of this five eighths that flow away in streams, the greater portion in the early spring comes down in torrents where the land has been cleared off. The Ohio river is an instance of this. The lands around the upper waters of the Ohio have been largely cleared off, and I have no doubt but what these floods of which we read will continue, because the water flows off so quickly from the denuded lands, and it is not held back by this sponge around the roots of the trees or by the woodland swamps.

THE PRESIDENT: Mr. Walker remembers the spot of the king's marked on the trees. About twenty-five or thirty years ago, I was looking through some timber in Boscawen, and I came across a number of trees with those marks upon them. I do not know but there are some there to-day. The distinct marks were there at that time.

MR. WALKER: I want to say one word here in regard to our president. Some years ago I was more enthusiastic in regard to this forest question than I am now. His Honor, Mayor Humphrey, he was at that time, was running a manufactory of kits up at West Concord. I asked him what he was paying for white pine wood—not timber but wood. He said that he was paying \$4 a cord. He was taking that wood to his mill, cutting out the knotty parts, leaving the sticks about fourteen inches long. From that wood, by

means of his machinery, he was cutting out mackerel kits and sending them to Boston. After he had told me what the wood cost him, I asked what a cord of it was worth after it was manufactured into mackerel kits and ready to go to Boston. He said, "That is considerable of a computation, and requires a little figuring." Two or three days afterwards he told me that he had figured it up and he said: "That cord of wood after it has gone through my mill is worth \$26." "Well," said I, "you have then paid \$4 and made \$22." "No," he replied, "I have not." I asked him where it went to then. He said, "It went into the pockets of my men." "Where then did it go?" "It went into the stores at Concord village, went to pay the store-keepers and market-men." That was the only industry that used to keep alive that little village of West Concord.

Now the moral to which that points is here: The Almighty has said to us, You have got to raise timber here. You cannot plow these hills and mountains, they are too rough; the rocky formations are set up edgewise, and it is impossible for you to plow these hills, and you cannot pasture very many of them. You should raise timber. Then, what? Then go to work and take care of your wood and timber lands. What next? Then instead of cutting them off and sending them in the log to Turner's Falls and various places in Massachusetts to be manufactured, manufacture them in the mountains and take the difference between the rough log and the manufactured product and put that into your pockets. Then there grows up a little village for the support of these manufacturers and their operatives, and then there grows up a market for the surrounding agricultural portion of the community. I take it that that is our destiny. In the first place we should accept what God has given us, be careful of it, and then work out our own salvation on the line that he has shown us.

PROF. BREWER: I question very much indeed if the Concord carriages would have gained and maintained the reputation that they have if those Concord coaches had been made out

of wood grown in other parts of the country. The fact of the matter is, that the oak and hickory of New Hampshire is tougher than the oak and hickory of the West. I think you will find that one reason why the Concord coach has such a large reputation is because of the timber of which it is made. I know from my own personal experience that when I want to use a rough mountain wagon I take special pains to buy a Concord wagon rather than one made in Ohio. The reason for that is that I believe the timber to be better.

THE PRESIDENT: Mr. Walker alluded to me as cutting up the small pines. I have done my share of that, I guess. At that time the only way was to buy the timber on the stump, and I put my men to work on it and got it out. The money that I got from this business I divided up amongst my friends and workmen, etc. I wish I was in that business now, but the time for that has gone by. It grew up with me and died with me. I started it in 1841. There was one good thing about it and that was, that I made an article good enough so that I always got into the market for all of anybody else. I got the highest price for the goods down to the last moment.

The first lot that I cut, I left some trees. I have watched them with a good deal of interest. They have now got to be great tall pines, while at that time they were not more than four inches thick. Sapling pine requires only about thirty-five years to get a comfortable growth and some of them get it in twenty-five years.

MR. WALKER: I would like to ask Professor Brewer why it is that oak that grows in the pasture is tougher than that grown in the forest.

PROF. BREWER: I cannot give any reason for it, except that it grows tougher in those places. Where timber grows close together it is not as tough as where it stands out. Precisely why that is so, I do not know.

MR. WALKER: Might it not be the fact that it grows out and has stood against the winds which has delayed its growth, whereas if it grows in a clump it grows more rapidly and for that reason is tenderer—like the plant under glass?

PROF. BREWER: As I have said before, I do not know. I do know that it is tougher than where it grows closer together.

THE PRESIDENT: This meeting stands adjourned until this evening at half past seven.

EVENING SESSION.

THE PRESIDENT: The hour for this meeting having arrived, you will please give attention to the remarks to be made by Ex-Governor Goodell. I will guarantee that what he says will be right to the point.

NEW HAMPSHIRE.

BY HON. D. H. GOODELL, EX-GOVERNOR.

Mr. Chairman, Ladies and Gentlemen:

The secretary has given me a subject, and that subject is one upon which I have talked so much during the last two years and indeed for the last fifteen years, that I am almost afraid that some of you who have heard me talk upon it before will hear some of the same things to-night.

But I am intensely interested in this great subject of the glorious old State of New Hampshire; for I was born in New Hampshire, have lived in New Hampshire ever since I was born, and expect to live here as long as I am among the living, consequently I do not see any reason why I should not be interested in my native State and the State of my home. I am proud of the old State of New Hampshire. I am proud of it because of her great products; I am proud of it because of the great men that she has furnished the world, and when I say that she has furnished more, according to her population, of the great moving spirits of the country than any other State in this country, I believe I am speaking the truth. For what State has produced the equal of Daniel Webster, or what States have produced a Pierce, a Louis Cass, a Zachariah Chandler, a Wilson, a Chase, a Dr. Miner, a Dr. Gordon, and multitudes of others of a similar character who could be named, that were born and bred in this grand old

State of New Hampshire? And I never felt more proud of it than I did early in the session of 1889, when Massachusetts came up here with a hundred men and brought us the picture of Benjamin Butler—that picture which you have seen on the right as you enter the rotunda of the state house, where it has hung ever since it was presented to us. When it was presented it became my particular privilege to accept it on behalf of the State, and I at that time felt proud because Massachusetts recognized New Hampshire as the mother of her great sons, and came here to present to us, not what we gave them, but simply a picture of him, because they would not let him go. I spoke at the time of the fact that when he was governor of Massachusetts the president of the Senate was George G. Crocker of Mount Vernon, New Hampshire; and the speaker of the House of Representatives was Marden, also of Mount Vernon; and the mayor of the city of Boston was Palmer, also a New Hampshire man. In the next Legislature the president of the Senate was the present attorney-general of Massachusetts, a New Hampshire man; and the speaker of the House was the late Governor Brackett of Massachusetts, who was born here in New Hampshire. And it seems as though whenever they wish to select their best men, they select those that we have given them. I said at the time that the old man of the mountain in the northern part of our State was the sign which the Almighty hung up there showing that he proposed to raise men in New Hampshire. That sign still hangs out there, and we still propose to do that sort of business—raise great men and women. Not only that, but we propose to make New Hampshire so attractive that these men will not leave us to go into Massachusetts and other sections of the country.

I am proud of New Hampshire because of its glorious scenery, the equal of which can scarcely be found in any other part of the country, if of the world. As was said here to-day by one of our distinguished citizens, it has a cash value. If in 1889 we received \$5,000,000 in this State, for our summer boarders, surely in 1890 we received a much

larger sum, for the popularity of our boarding houses and hotels, the grandure of these mountains and hills, the beauty of our lakes and rivers, are continually increasing and the people are coming here every year in greater and greater numbers.

I am proud of New Hampshire because of its opportunities. And its opportunities and privileges are continually increasing. A few years ago Massachusetts had a great advantage over New Hampshire in many respects. Our Massachusetts friends will not, I am sure, find any fault when I speak of the few facts that I am going to relate. A few years ago the manufacturing cities of our neighboring State had a great advantage over New Hampshire from the fact that we were up here in the country and were left out in the cold, as the saying is. If we attempted to manufacture anything, we were obliged to send it to Boston or some other place near there before we could start it on its journey to the West or South. I mean by that, that we were obliged to pay freight on all our products to some place in Massachusetts before we could get the advantages they had. I have been often told that it was a strange thing for me to attempt to do a manufacturing business way up in the country where I live. When I began I was obliged to cart my freight seventeen miles to reach a depot and then pay local freights from there to Boston, before I could get it started on its western course at the same rates at which nearly all the cities of Massachusetts could ship their goods. But this is changed. It has changed so far as I am concerned; it has changed so far as you are concerned; it has changed so far as people in almost all the sections of the State are concerned. And instead of our being obliged to pay more than they do in Boston, or New York city even, we are now able to ship our freights to Chicago, St. Louis, Minneapolis, Cincinnati, and all western points just as cheaply as we could if we shipped them from the depot in Boston. A short time ago I received a book from a transportation company in which they said that they would take my freight at my depot and deliver it at all points named in that book at the same rates as from Boston or New York.

I looked that over carefully and found that, with the exception of a few cities and towns on the Atlantic coast, I could deliver my goods from our depot to all southern points at exactly the same rates of freight that I could if I lived in New York or Boston. You see what an immense advantage that has given us as manufacturers over what we had a few years ago when we were obliged to carry our freights into Boston and pay the local rates before we could get the advantages that they had. You remember what was told here by the distinguished horticulturist and market gardener, Mr. Rawson, when he said that a man could hardly afford to be ten miles away from the market if he were going to be a regular market gardener; and if a man could be but two miles away, it would give him a wonderful advantage over his competitors further away. We have been practically living further away from the markets of the world than the cities of Massachusetts, but now we have the same advantages in that respect as they, and we may now expect our population to increase much more rapidly than it has in the past. Of course we cannot expect to rival Boston, but leaving Boston outside, with its four hundred thousand people, they have four or five times as many people living in Massachusetts as we have in New Hampshire. We have, however, acres of territory more in New Hampshire than in Massachusetts; we have stronger rivers than in Massachusetts; we have a vast deal more water power, occupied and unoccupied, in New Hampshire than they have in Massachusetts. We furnish, it is true, the Merrimack to the cities of Lowell and Lawrence, and we also furnish water power for Holyoke and Turner's Falls; but we have all the rest of these rivers to ourselves, and they give us an enormous amount of water power that is not used at the present time. That means reserved force. We also have better land, as a rule, than they have in Massachusetts that is available, and there is no reason why the agricultural population should not keep pace with the manufacturing population. We ought to be able to grow as we never have before. It does seem to me that we have got

started in the right direction. It seems to me that we never were in so favorable circumstances and never in so prosperous condition as we are to-day. It seems to me that the sentiment of the people of our State has changed wonderfully during the last few years. It seems to me that that old idea which prevailed as long ago as I was a boy, when Daniel Webster said that New Hampshire was a good State to emigrate from, has changed to a wonderful degree. I think that was one of the meanest things that Daniel Webster ever said, but it was in accordance with the sentiments of those times. The time has now come, however, when we can stand on an equal footing with other States, so that we may now call ourselves the hub of the universe, if we please, so far as manufacturing is concerned. We all feel that we have something in New Hampshire that is worth our cultivating and our efforts. Now I am sure that you will all agree with me that it is better for us, for our sons, for our daughters, for our neighbors, and for our friends to remain around our old homesteads and in the climate in which we were born and reared, with the associations with which we have been surrounded from early childhood, here in the midst of churches and schools—that you will all agree with me that it is better for us to remain here, if we can find employment and can be as successful as we can elsewhere, than to go out into other places. For here we are more likely to be in the enjoyment of good health, of privileges and blessings that we can never get anywhere else. If that is the case, why should not we open our eyes and see the great privileges that surround us, why should not we teach our neighbors and our friends that we can do just as well here as anywhere else, why not present to them the examples of great successes that have been gained here in New Hampshire and tell them of the failures of many of our friends that have gone away? We hear of the Austin Corbins, of the Pillsburys and that class of men who have gone from New Hampshire and succeeded, but we do not hear of the young Raymond or Smith or many others, who have gone away only to return perhaps decrepit

and old and weak and enfeebled and poor. It is time for us to stand up for New Hampshire. It is time for us to stand up for New Hampshire agriculture. It is time for us to remember that New Hampshire farmers are the most successful farmers in this country. It is time for us to remember that the New Hampshire farmer has more accumulations than any other farmer in all the world. It is time to remember that within the last year we have put into the savings bank \$8,000,000, more than twice the amount, according to the population, put in by any other State in the country. I ask then, these being the facts, why should we not publish them to our neighbors, and to our friends, and constantly bring up before them the opportunities and the privileges we have here at home. But some of you will say that this vast accumulation in the savings bank comes from the manufacturers and manufacturing cities, and places where they make great wages. That is not true. The city of Manchester has \$140 apiece in the savings bank, for every man, woman, and child that she has in the city. The little town of Bow, down here has got \$336 apiece; that little town right down close by the water; that town that has been improving its opportunities; that town invites people from all the world to come and enjoy its blessings there—that town has \$336 per inhabitant in the savings banks of the State. Over here is the little town of Newbury and I believe there are about five hundred people in it. Almost everybody acquainted around here knows that it is about the poorest farming town there is in the State; yet she has \$255 in the savings bank, for every man, woman, and child. What more arguments can we produce to convince you of the prosperity of New Hampshire. The farmers of New Hampshire have got the money in New Hampshire. Although there may be a few rich capitalists who have made greater successes than most of the farmers have made, yet as a rule the farmers are the men who have the money of New Hampshire. With these facts before us, we do not want to wait until next year or next month, but it is now, that the people of New Hampshire should stand up in

their dignity and declare that we here in New Hampshire are on the topmost round, so far as financial prosperity is concerned, and so far as the prosperity of our schools and churches and all our people are concerned. This, my friends, I urge upon you all to do.

I must not take more of your time this evening for I know that you are waiting to hear from my distinguished namesake, yet I wish to urge upon you the importance of forgetting the past and looking towards the future, determining that New Hampshire shall no longer remain in the rear but that she shall take front rank, as an agricultural State and as a manufacturing State. Let us all act together in this line of work, and we shall come out finally among the most prosperous of the States. In some respects we are the most prosperous to-day. So let us stand on our dignity and let us be firm in our convictions as in our principles. Let us teach our children that they can live in New Hampshire and enjoy as great privileges and as great blessings as they can in any other part of the earth.

THE PRESIDENT: Governor Goodell, as he was speaking of the great men that were raised in this State, did not tell you that they came from around the mountains of the State. Samuel P. Chase was raised near Croydon mountain, and that is where the Corbins lived. So we may find the same circumstances to have surrounded the boyhood of others of New Hampshire's great sons. Why is this? It is because they, as boys, were brought up to habits of industry and thrift. Their surroundings compelled them, and their fathers and mothers taught them to work, and that laid the foundation of their future greatness. They knew what work was and they knew what it was to have trusts imposed upon them. They learned that early upon the farm. I think this thing we want to keep well before the people—where we raise our great men and women. New Hampshire produces great women as well as great men. I came from Massachusetts into New Hampshire for my wife, and she was the making

of me. I also got my second wife in New Hampshire. And if New Hampshire produces all such women as they, it is no wonder that men should take their wives from here.

I want to say that I am Massachusetts born, and while I have been here forty-five years and have gained what success I have gained in life in New Hampshire, I always will stand by the old colony of Massachusetts.

I now have the pleasure of introducing to you President Goodell of the Massachusetts Agricultural college, who will speak to you on the subject of "Agricultural Education."

AGRICULTURAL EDUCATION.

BY PROF. H. H. GOODELL, PRESIDENT MASSACHUSETTS
AGRICULTURAL COLLEGE.

The question that has been set for me for this evening's address is, "Of what value are agricultural colleges to the farming interests?" Perhaps I can best answer this by asking another question, found in a book that contains the wisdom of an age two thousand years older than this: "How can he get wisdom that holdeth the plow, and that glorieth in the goad, that driveth oxen and is occupied in their labors, and whose talk is of bullocks?"

Apparently the same need of instruction was as urgent then as now, and the tiller of the soil in the fertile plains of the Eastern world, felt there was something more to be desired than simply following, day in, day out, the dreary routine his fathers had left him. That there were sources of information even then, is evident from the fact that the wise Solomon could discourse of trees, from the cedar of Lebanon even to the hyssop springing out of the wall; and it is added, that he spake also of beasts, of fowls, of creeping things, and of fishes. The same questions that stirred the heart of the agricultural seer so many centuries ago, are pressing with renewed force now, and more light is sought on all the difficult problems that present themselves to the farmer of to-day. It is the mission of the agricultural colleges to furnish this

light and lead the way. But this cannot be done on the instant. It requires time. Said President Clark, "ten years are necessary to establish one agricultural fact," and it is only upon an aggregation of facts and experiences that stable law can be based. Or putting it in other words, "It is but the sum of what is known on any subject, so collected and arranged that use can be made of it." But this patient waiting was just what an impatient public could not brook and no sooner were the agricultural colleges established than results were instantly demanded, and because the wornout meadows and unproductive thistle patches were not forthwith changed into smiling fields of waving grain, the whole system of agricultural education fell into disfavor. It was forgotten that the land was new and untrodden, and that even spies could not be found to adventure forth and bring back tidings of the promised land. It was forgotten that there were no agricultural, no horticultural professors. Hardly a single professor of veterinary science and no text books applicable to our conditions or circumstances. The whole system of instruction and instructors was to be created out of nothing—out of such raw material as was found ready at hand. But this was not thought of, and results—immediate results, was the cry. In the first flush of enthusiasm at the undertaking of scientific investigation, a squash had been harnessed in an iron yoke, and by the expansive force of its growing cells had fairly swung the lever from which depended the enormous weight of 5,550 pounds; a maple tree had been tapped, a gauge inserted, and the pressure of the flowing sap had been proved to represent the force requisite to sustain a column of water eighty-four feet in height; the roots of a squash vine had been washed out and measured, and found to aggregate about fifteen miles in length, having been produced at the rate of one thousand feet per day. These were highly interesting facts—facts that led the gifted Agassiz to say, that they alone were worth all the money that had been expended thus far in the establishment of the college; but they were not immediately conducive to the getting of bread, and forthwith the public fell

upon the college and said they would have none of it. That mercurial people, the French, with all their restlessness and activity of mind, have set us a noble example of the patient waiter, and at an annual expenditure of \$1,000,000,* calmly waited a full decade of years and tested their educational system in agriculture before making it compulsory and enacting a law enforcing it. The Germans have been content slowly to add link to link, making persistent effort to take advantage of every period in the development of mind of those destined to agricultural pursuits, until they have elaborated their present carefully rounded system, each link, complete in itself, and yet absolutely necessary to advance to a higher grade. And even the Italian minister of agriculture, at the opening of one of the higher schools, is reported to have said: "The stately tree is the growth of years. We do not cut it down because in its first decade it bears no fruit, for it is storing up within it the possibilities of centuries; and so we do not look for fruit from you at once. It may not be in this generation, but all the same, your instruction will make itself felt in the end, if to your art you are but true."

Another factor in the apparent failure of agricultural colleges has been the lack of appreciation on the part of those they are especially designed to benefit. We are told that there was once a man, who, wanting to learn for what profession his son was best adapted, finally hit upon the expedient of shutting him up in a room with a Bible, an apple, and a dollar bill. For he reasoned thus: If on his return, he found him reading the Bible, he would make a minister of him; if eating the apple, a farmer; and if playing with the dollar bill, a banker. Well, as the story goes, when he returned, he found the boy had solved all difficulties. He had pocketed the dollar bill, had eaten the apple, and was sitting on the Bible. Recognizing the eternal fitness of things, the anxious father immediately made a politician out of him.

It has seemed to me that this is not an inapt description of

*The latest information makes France spend for the encouragement of agriculture yearly, \$8,000,000; Austria, \$4,000,000; Germany, \$2,850,000.

the way in which many an unlucky youth has been placed in a profession for which he was no more fitted than the ordinary mortal is to fly. Too often chance and haphazard have guided the choice, while with a serene reliance on the hand of Providence to smooth away all the difficulties that may arise, the unhappy tyro has been launched on his career of usefulness.

The draft horse is not fitted for a trotter. His build and make-up unfit him for a light and speedy course over the ground. And so of the boy. His talents and natural instincts may lead him in some other direction. Then why spoil a good mechanic, or engineer, or teacher, by making a poor farmer? or a good farmer, by making a poor minister? All that is good in one, is likely to be stirred and brought out by what he is interested in, while on the other hand, task labor just as surely stunts the soul and leaves its finer feelings dormant.

Do you remember in that beautiful tale of Sir Walter Scott, "Red Gauntlet," the trial of skill that took place between Wandering Willey, the blind fiddler, and young Darsie Latimer, the hero of the tale, and how, when the latter had executed a most brilliant and difficult passage, the old man quietly took the bow and after imitating his style in a very laughable manner, administered the following rebuke: "But for a' that, ye will play very weel wi' a little practice and some gude teaching. But ye maun learn to put the heart into it, mon, to put the heart into it."

My friends, farming is like everything else, — unless you put the heart into it and approach it with the enthusiasm you do the other professions, you will certainly be left behind in the race of life; for it will become your task-master and you, its reluctant slave.

If the agricultural colleges should accomplish nothing else than to awaken in the farmer a love for his calling and stimulate him to put forth his best efforts, efforts arising from the very depths of his heart, they will have taken the very first step towards bettering his condition.

An idea advanced in a recent address on horticultural education by one of the teachers in Boston, has seemed to me worthy of consideration. He says, "A large majority of our public schools have done little or nothing in the study of plants, insects, minerals, and soils, alleging that such studies are not practical." What is the opinion of agriculturists on this matter? Are not potatoes and wheat practical things? Is there anything theoretical about the potato bug and the currant worm? Anything psychological about loam and phosphates? Anything allegorical about the codling moth and the peach tree borer? And then he proceeds: "For years past we have been reaping the natural results of a system of education, that, intentionally or unintentionally, turns all our young people for a livelihood toward the occupations of teachers, college professors, lawyers, physicians, clergymen, bookkeepers, salesmen, musicians, artists, agents, and business men, under which head, multifarious and heterogeneous legions of middle men are pleased to class themselves. These men have had the control of educational affairs, and they have kept the schools turning out their kind so long, that there is unquestionably in this country, an overwhelming surplus of middle men, non-producers and men living by their wits. Such a surplus is certain to make trouble. All are determined to live in affluence if possible—genteelly at all events.

"Consider what studies have been introduced in the common school curriculum within a comparatively few years—sewing, cooking, manual training for boys, kindergartens, and various modifications and better adaptations of every branch of study. Kindliness to animals has been advocated in all the schools of the commonwealth. The temperance people have had a compulsory school law passed. Instructors in hygiene have been employed. The entering wedge of the Sloyd system of manual training has been admitted. A mighty conference of the leading spirits in educational training has been held in Huntington hall and the representatives of various religious denominations have waged a war of words, con-

cerning the teaching of history and religion in the schools. Among all these things advocated, there has been no suggestion of agriculture, but during their advocacy much has been said about sending the whole boy to school, when apparently what the whole boy is has not been determined. His earthly part, or rather his relation to the earth, has been entirely left out."

The old medieval idea of a scholar was one who did not have flesh enough upon his bones to hide an indecent exposure of his soul. Thank fortune! that idea has exploded, and the man of large brain has learned to feed his body generously and strongly that it may form a proper framework for the living soul. Bone and muscle of the body are the fit accompaniment to the brawn and sinew of the intellect, and the strong, healthy body goes hand in hand with the strong, healthy mind.

The idea—too prevalent, alas! even in recent times—that any one could be a farmer is also gradually dying out, and the world is learning that to be a successful farmer requires as much genius and knowledge, as to succeed in any other one of the professions. The story told by George Eliot, in the "Mill on the Floss," only too well reflects the contemptuous opinion held by farmers themselves, that anything in the way of an education was good enough for a farmer. It is farmer John who speaks. "What I want," said he, "is to give Tom a good eddication; an eddication as ud be bread for him. That was what I was thinking of, when I gave notice for him to leave the academy at Lady Day. I mean to put him to a downright school at midsummer. The two terms at the academy ud ha done well enough, if I'd meant to make a farmer of him, for he's had a fine sight more schoolin' nor ever I got. All the learnin' my father ever paid for, was a bit of birch at one end and the alphabet at the other."

Yes. A bit of birch at one end and the alphabet at the other! That has been about the idea of what was needed, and the old paradox was devoutly believed—

“That the man who couldn't write his name
Was the man who made his mark.”

Why! the fact is that agriculture deals with a larger number of problems in the mysterious forces of nature, and problems that are more vital, than any other science whatsoever. All the other sciences minister to her, for she is the mother of all. The great Liebig said, “There is no profession which for its successful practice requires a larger extent of knowledge than agriculture, and none,” he goes on to say, “in which the actual ignorance is greater.” Carey in his “Social Science” says, “Of all pursuits of man, agriculture is the one requiring the highest degree of knowledge.” So Xenophon, “Agriculture is the nursing mother of all the arts.” It was the gifted Newhall, who, looking forward with prophetic eye to the day when the scientific practice of agriculture would prevail, exclaimed: “The intelligent farmer will then regard the atmosphere as the vast magazine and storehouse of those materials from which the organic parts of animal and vegetable life have been derived. He sees by chemical light the invisible carbonic acid elaborate and assimilate to the different forms of being, while he knows that from the soil, the inorganic portion of the vegetable frame is obtained. And in the wondrous round of growth and decay, he perceives that nothing is lost on the dissolution of organic life. One part returns to the earth, and the other flies to the atmosphere in the form of gas, ready to enter into new combinations of animal and vegetable life. Thus growth, decay, and putrefaction will be to him but links in that endless chain of motion going on around us. There is no death. For out of death comes life, and death is but the commencement of living force in some other form.”

“See dying vegetables, life sustain.
See life dissolving, vegetate again.
All forms that perish, other forms supply,
All served, all serving; nothing stands alone,
The chain holds on, and where it ends—unknown.”

In his *Principles of English Agriculture*, Wrightson says, "Agriculture is not chemistry any more than chemistry is agriculture. Agriculture is statistical, while chemistry deals with compositions and there is abundant scope for chemical investigation whether considered in its bearings upon the composition of soils, the ingredients of the ash and of the tissue of plants, or the nutrient value of seeds and feeding stuffs, the composition of the increase of fattening animals, or the genuineness of substances offered as fertilizers. In all of these we see the immense value of chemistry and of chemical knowledge. Again all questions connected with the nutrition of plants and animals, the sources of nitrogen, or the processes by which crude and mineral and organic matter are converted into available plant food, are eminently chemical qualities, to be decided by analysis and the balance. Now in the same way it would not be difficult to show the vast opportunities of other sciences as well as of chemistry in relation to agriculture. What, for example, can be more important than the bearings of botany upon the pursuit of agriculture? The ramification of the roots of plants, the fertilization of seeds, the knowledge of plants which may be introduced, the identification of injurious plants either in the form of pernicious weeds, or it may be in tracing the life history of those cryptogamic or fungoid forms which so often are the cause of loss to the farmer, as, for example, the potato disease and other blights and mildews which effect our crops.

"Scarcely less important is the subject of physiology, dealing as it does with the functions of animal and vegetable life. So, also, it would be difficult to convey anything like an adequate idea as to the history and attributes of soils without imparting a good deal of knowledge which belongs essentially to the science of geology. While the natural sciences are of prime importance in solving difficulties and suggesting improvements, it can scarcely be denied that the great subject of agriculture requires for its full explanation a knowledge of mathematics, engineering, and physics; and there is, perhaps,

scarcely a branch of human knowledge, which might not easily be shown to have a practical and important bearing upon the usages and customs of agriculture. Take, for example, meteorology and even astronomy. Consider for a single moment the influence of the sun as a factor in the germination of seed, and then reflect upon the nature of sun-heat and sun-light, and we shall find that plant and animal life are intimately connected with the phenomena essentially belonging to the domain of the physicist, the astronomer, and the electrician."

The fact is that in order to teach the theory of agriculture, a whole faculty is required, just as much as in the teaching of medicine, of law, or of divinity. It is too much to expect one man to grasp the whole of this world-wide subject,—and therefore, in any agricultural college, it is necessary that chairs should be established for the teaching of chemistry, physiology, geology, anatomy, physics, and mathematics. The teacher of agriculture can do little more than indicate the points of contact between his own great subject and the sciences which surround it, leaving the explanations to those into whose domain they properly fall.

With this broad definition of agriculture—itsself a science, complete in itself, yet touching all sciences and all branches of knowledge—and taking as our guide the law that the teacher of agriculture can but indicate these points of contact and leave to others their explanation, we have endeavored to rear our superstructure of agricultural education. Agriculture our foundation. Botany, chemistry, veterinary, and mathematics, our four corner stones, while the walls are built up with horticulture, market gardening, and forestry on the one side; physiology, entomology, and comparative anatomy of the domestic animals on the other; mechanics, physics, and meteorology on the third; and a study of the English language, political economy, and constitutional history the fourth. These five courses, each distinct in itself yet each aiding in the interpretation or solution of the difficult problems met with, require a four years' course. They pro-

ceed hand in hand, and the completion of a study in one department is coincident with that in another. Mutual help is the watchword. Each for all and all for each in the laying broad and deep the foundation, and building up the solid structure. Thus when the relations of the weather—of heat, air, moisture—to farming are considered, on the botanical side are being studied the structure of the plant, its organs, the relations of its root system to soil and moisture; on the chemical, the elements important in an agricultural point of view and their properties; and in mathematics, such algebra and geometry as will lead on to practical work in surveying and drainage. So too, when soils and tillage are considered, in like manner are studied, plants beneficial or injurious to man, general geology, and those insects hurtful or otherwise to the crops. In short, the effort is made to have each course supplement and be in harmony with the other, and the different studies so fit into each other as to make one rounded whole.

Do these studies seem to you too many, or perhaps not bearing strongly enough on the main subject? Consider for a moment the magnitude of the interests involved, and then say whether the end does not justify the means. The study of “bugs,” as the average man puts it, seems but a trivial thing, but damage to the amount of \$200,000,000 it is estimated is annually done to our crops by insects, and the farmer is apt to look upon each of the myriad crawling, creeping, jumping, flying things as a personal enemy, falling under the original curse and to be exterminated at all hazards. In the present condition of his knowledge the only alternative left him may be suggested by quoting the brief, comprehensive, but very intelligible address of a colonel when leading his regiment into action, “There’s the enemy; if you don’t kill them they’ll kill you.” There was a time when the potato bug as it started on its devastating mission from the far West could have been stopped. The alarm was sounded by Western entomologists and Congress was asked to appropriate a sum for its extirpation, but the petition was

sneered at. To-day it is costing the farmers of Massachusetts \$80,000 annually and the farmers of the United States \$2,000,000 annually to hold it in check, by the use of Paris green.

The only effectual way of combating the insects whose name is legion, is by studying their life histories, following them through all their transformations up to the perfect insect and learning their habits and methods of attack. They have their diseases as well as animals of larger growth, and it is quite within the bounds of possibility, that we may yet be able to inoculate them with some disease, the measles or plague perhaps, that will sweep them away by the millions. Think what a boon that would be to the harassed grower of tobacco, or raiser of potatoes! But a short time ago, the orange groves of the Pacific slope were threatened with destruction by the ravages of a scale bug, which in spite of every effort was ruining the trees. The entomological department at Washington sent a commission to Australia to study the habits of the pest in its native haunts. It was found that a lady bug was its deadly foe and an effort was made to send colonies of them to this country. On the 30th of November, 1889, twenty-eight arrived; on the 29th of December, forty-four; and on the 24th of January, 1890, fifty-seven, — in all one hundred twenty-nine. These were placed on an orange tree infested by the scale bug, a tent being placed over the tree to confine them in one place. Before the following April they had killed all on the tree and had multiplied to such an extent that one side of the tent was raised and they were permitted to spread and carry on their good work. The orchard was cleaned in a brief two months and in June colonies numbering 10,555 individuals were sent to 208 localities, in every case proving a complete success, clearing the trees and spreading to neighboring orchards. This is but a single instance of the work accomplished by the trained entomologist in combating one insect by introducing another to prey upon it. The discovery of a parasitic fungus, fatal to the life of the clinch bug, and its successful introduc-

tion into fields of wheat which were rapidly being destroyed, bids fair to be the means of saving our farmers in the West millions of dollars.

Physiology, anatomy, and zoölogy might seem to be unnecessary, but they all lead up to a proper study of veterinary, and that involves the proper health and care of the domestic animals. Census returns give their valuation in this country at over \$2,400,000,000, and it is computed that there is an annual loss of six per cent resulting from disease, much of which is preventable.* Is not this a proper field for the agricultural colleges, and is there no lesson of value that can be brought home to the farmer in the improved condition of his stock?

Unable to compete with the West in the great staples, those crops are being raised that will bring the quickest substantial returns, such as dairy products, small fruits, and market garden produce. To show how to develop along these lines, how to secure an increase in quantity of farm products, how to improve the quality, how to raise better fruit, better vegetables, better stock, is the mission of the agricultural colleges.

It was President Clark, who, speaking of meteorology, said: "The study of the great forces of nature, which are so intimately connected, and which produce the infinite variety of changes in the forms and qualities of matter constantly occurring within and around us, is of the utmost importance. The heat, light, and chemical forces, which exist, united mysteriously in sunshine, are the power upon which agriculture is especially dependent. In the mass of the earth, sunshine produces electricity and magnetism. In the atmosphere, those currents which mix and temper the constituents of the air, and furnish a most valuable motive power; while from the ocean is raised in the form of invisible vapor the moisture, which descending as dew, rain or snow, refreshes vegetation, feeds the springs and streams, or clothes the earth in

*In 1890, the loss from disease varied from 1.6 per cent with horses, to 7.6 per cent with swine.

its wintry mantle. This process of evaporation also unites the elements of ammonia to furnish the indispensable stimulus of plant growth, while the watery vapor in the air around and above us, shuts in, like the glass of a plant house, the obscure heat of the earth, which would otherwise be radiated into space so rapidly as to render the climate of New England inhabitable. To understand what sunshine is and does, is, therefore, essential to intelligent, scientific agriculture."

Again, the whole subject of wastes, of what crops it will pay best to grow, what exhausts the soil, and what does not, how to feed and what to feed, and how long to feed in order to fatten at a profit, and when to sell, these are questions that have risen into first importance, and any instruction that will enable the farmer to put forth his efforts more understandingly and intelligently must be of the greatest value. The penny saved is tuppence gained, and the tuppence gained is just what makes the difference between poverty and comfort. To be successful in these days of sharp competition, we must know "how to feed the land while the land feeds us." To raise the largest amount on a given area at a minimum cost is the problem most are struggling with. Have not your own college and station commended themselves to your favorable regard in the carefully worked out formulæ which they have published of the best proportions of bone black, muriate of potash, and sulphate of ammonia for corn, wheat, oats, ensilage, hay, and potatoes? Commissioner Harris never made a truer remark than when he said: "There is a minimum of originality and inventive power on the part of the agricultural populations of the entire world. They are the most conservative of all people. The agricultural college has a great career to make in this line, because there is so much to be done. The coming in of the laboratory in the form of the agricultural experiment station is the point on which the agricultural college is wheeling around to lead in this, the greatest work of American education." The increase per acre of one single bushel, to the yield of wheat, corn, and oats, in this country would make an increase in the value of

those crops alone of over \$164,000,000 a year, which would be more than doubled by a similar increase in other crops, and this can be easily accomplished by the use of seeds of varieties, carefully tested. In France, in one district, the yield was raised from thirteen bushels per acre from local varieties, to forty-eight bushels from a foreign variety, carefully selected and tested at one of the experiment stations. Blount of the Colorado Experiment Station has demonstrated the same thing, having raised wheat at the rate of 100 bushels to the acre.

The loss of manure in the Commonwealth of Massachusetts has been estimated at \$2,000,000 annually. If but one half of this could be saved and applied scientifically, who can estimate the additions to the product of the soil? It has been proved at the New York Station, that the value of the solid and liquid manure produced by dairy cows is equal to forty per cent of the market value of their food and that the value of the liquid part is sixty-one per cent of the total value of the manure; that the annual cost of the food of a dairy cow is \$52, and the relative value of manure produced is \$36.40. Is it nothing to teach the farmer that sixty-one per cent, or about \$22, of this amount commonly wasted can be saved? Too often has he looked upon the ammonia as not worth attending to, but viewed in the light of dollars and cents, or the credit and debit side of his ledger, it becomes an interesting, practical point.

Grandeau has gone still further and estimates that a single year's crop in France represents 298,200 tons of phosphoric acid, of which only 151,200 tons are received from stable manure, there being a deficit of 147,000 tons, equal to about 1,000,000 tons of superphosphate to be made good. These are but isolated facts. But it is from an aggregation of facts that laws are deduced and principles laid down which can be of use to the farmer. It is the especial province of the agricultural colleges to take up and carefully investigate these difficult problems.

The farmer has gone on in the good old way raising his

hay and feeding it out to his stock, careless of the manurial value returned to the soil, careless of the amount of food constituents contained in it, careless of the question, whether it would pay him better to feed out that crop or some other. His fathers had pursued this course before him and had lived comfortably. Why should he change? To-day, to use a single illustration, the question stands something like this:

Twelve dollars paid in the market for either of the following fodder articles will procure the following number of pounds, containing the following amounts of food constituents:

	Weight of article.	Manurial value.	Net cost of fodder.	Food constituents in fodder.		
				Pro-teine, pounds.	Fat, pounds	Carbohy-drates, pounds.
Corn meal.....	1,200	\$4.50	\$7.50	118	46	835
Wheat bran.....	1,412	10.50	1.76	224	58	748
Wheat middlings..	1,200	6.45	5.55	198	50	755
Gluten meal.....	1,000	8.50	3.50	290	61	539
Cotton-seed meal...	923	9.11	2.89	358	114	237
Linseed meal (O. P.)	889	9.67	2.33	295	46	333
Linseed meal (U. P.)	960	11.52	0.48	.....	.....	.....
Timothy hay.....	2,000	5.50	6.50	141	42	946
Corn stover.....	4,800	11.52	0.48	330	84	2,197
Sugar beets.....	4,800	2.76	9.24	92	5	299
Mangold wurtzel...	8,000	4.40	7.60	102	9	703
Skim-milk.....	6,000	6.75	0.25	107	13	262

Which is the cheaper? Shall he go on using timothy hay, or corn stover, or cotton-seed meal? or what combination will he find best, of, say, one half corn meal and one half corn stover resulting in *e. g.*

	Weight of article.	Manurial value.	Net cost of fodder.	Food constituents in fodder.		
				Pro-teine, pounds.	Fat, pounds	Carbohy-drates, pounds.
One half corn meal	3,000	\$8.01	\$3.99	224	65	1,677
One half corn stover	3,000	8.01	3.99	224	65	1,677

All these are questions of the utmost practical value to the farmer, which college and station alone can solve. One more

illustration drawn from feeding and I will conclude this portion of my lecture. The farmer fattening pigs for the market does not realize when he disposes of his three or four hundred pounds of porcine monstrosity that it has been at a loss and not a gain to himself; that up to one hundred fifty pounds he has been putting on flesh at a minimum cost, but that above that, pound for pound he has been increasing his outlay and diminishing his profits. Yet the minimum cost of fattening has been carefully worked out by experiment and practical instruction on this most important subject given at the colleges. Is it nothing to teach the farmer as a late report from the Wisconsin institute does, that we do not exhaust land by selling the fat of animals, but we exhaust when we sell their muscle, their bones, their hair, their skin, and horns? We exhaust land when we sell milk, cheese, or eggs, but not when we sell butter. If we sell \$200 worth of wheat, we sell \$48 worth of plant food from the soil. If we sell a horse worth \$200, we sell \$7 worth of fertility; while if we sell \$200 worth of butter, we sell less than \$1 worth of plant food. Are not these figures well worthy of the agriculturist in determining what he shall grow for market?

But why go on enumerating studies and presenting illustrations, the value of which must be apparent to every thinking mind. Our only trouble is that within the compass of a four years' course we cannot introduce all those branches that seem to us important, and we are continually in danger of overtaxing the student.

Now for a farmer to have a thorough knowledge of his profession and be able to do it skillfully and profitably, he must learn two things:

“1. What to do; how to do it; and when to do it.

“2. He must acquire the manual skill to do it and to do it well. The first, or the what, the how, and the when, constitutes the science of agriculture. The second, or the manual skill, the art. The first he learns at the college. The second must be learned at home.” For the time of the student is too valuable to be spent in plowing and hoeing. It is rather to

learn why to plow and hoe at all, and when and where to do it to the best advantage that he goes to college.

But what is the value of agricultural education? What is the use of an agricultural college? We are reminded of the great scientist, Faraday, who when questioned as to the usefulness of his discoveries was accustomed to reply, "Of what use is a baby?" It is nought now, but who can estimate the possibilities that lie stored up within the clutch of its tiny hand? Let us turn for an instant to those countries where it has longest been pursued and see what have been its results. France, with 37,400,000 inhabitants, supports a population of 184 to the square mile, and has 18,200,000 engaged in agricultural pursuits. Germany, with 45,200,000, supports a population of 213 to the square mile, and has 18,800,000 engaged in agricultural pursuits. Great Britain, with 35,200,000, supports a population of 291 to the square mile. In Germany the almost universal testimony of those in charge of the schools, is of the beneficial effects upon the peasants. Better rotations have been put in practice, hand-labor has given place to improved machinery, the number of acres under cultivation has been multiplied, the product per acre has increased twofold, a great variety has been added to the list of products, and the adaptation of crops to soil has been more carefully studied.

France has become a vast garden, "the best cultivated country," according to the Banker's magazine of New York, "in the world; whose revenue from its land alone is estimated at \$550,000,000," and whose exports in 1884, of articles of food and cereals, footed up to \$165,302,200, and its wines to \$47,450,000 more. Its agriculture certainly pays, for one half of its population are engaged in its pursuit. Next to the United States and Russia it has become the greatest wheat-producing country in the world. Its forests, carefully superintended by pupils from the great school of Nancy, yield it an annual revenue of \$50,000,000. The denuded slopes of the Alps and the Pyrenees, down which poured the mountain torrents, filling up and covering over the fertile

plains with coarse debris, have been covered with smiling verdure to their very summits, and the waters have been led captive into the channels prepared for them. The sand dunes on the west coast, advancing at the rate of 14 feet per annum, and transplanting inland 90 cubic yards of sand per yard of coast line, have been arrested in their course, and 224,154 acres have been reclaimed and covered with trees and shrubs.* The cultivation of the sugar beet, carried to the highest perfection, has twice saved the country from national bankruptcy.

In England fifty years ago, the normal yield of wheat per acre was thirteen bushels, the latest returns make it 31.24 per acre. So, too, the hay crop. By a judicious use of fertilizers, Messrs. Lawes and Gilbert have raised the yield per acre from 2,300 pounds to 6,400. The barren plains of Norfolk, stretching for miles their sandy wastes, with here and there a stunted growth to mark the effort of nature to reclaim them, have been transformed into broad fields of life-sustaining crops; and the fens of Lincolnshire, reeking with malaria, have been changed into the granary of England.

A writer in one of our daily papers only a few months ago, says: "The present drawbacks in New England farming are the neglect of farmers to have their sons take advantage of the almost free agricultural schools instituted for their benefit; their want of mechanical and chemical intelligence so necessary in agriculture; their unmethodical methods, carelessness of machines and tools; their imperfect production in dairy results; their waste of materials; neglect of social intercourse; improper diet and too much hesitation in taking their proper position, coördinate with other citizens in regulating the affairs of the country, and urging forward all such reforms as civil service and the new ballot."

In a word then, the agricultural colleges have as their mission the elevation of agriculture into a wealth-producing industry, and they aim to do this by teaching four things:

1. To teach the farmer how to experiment.

*Consular Report. Forestry of Europe, 1887.

2. How to produce at the least cost, abundant agricultural commodities of the best quality.
3. How to dispose of these commodities to such an advantage that a reasonable reward for labor may be enjoyed.
4. How the farmer may as a class attain the highest culture, so that their best development shall carry with it the promotion of the welfare of the other classes of society and of the whole nation.

But more than all this the colleges should be the great distributing centres of information to the entire agricultural community—the medium through which the collected knowledge of the world may be imparted to the farmer. Many years ago before an agricultural college was established, Professor Fowler turning from his study of the English grammar and its principles, exclaimed: “What we need is an organization, under authority of the State, which shall collect the scattered light, whether in this or another hemisphere, so that it shall become effectual, and not any longer be ‘Light shining in darkness and the darkness comprehending it not.’” What we need is an organization which shall collect the light of science and of practical experience into an agricultural institution, as into a focus, from which it can go forth, as from a radiant point, over the commonwealth and the country.

MR. LYMAN: I would like to ask the Professor if there is any organization between the agricultural colleges of the nation with a systematic plan of the work that each should do laid out. And if there is not, I wish to ask if he does not believe that there should be a gathering of the representatives of the agricultural colleges to talk over and devise means by which they might, to a certain extent, coöperate with each other and by that means work harmoniously, thereby producing greater results to the nation?

PROF. GOODELL: Yes, sir. And there is an association of that character. The Association of American Agricultural Colleges is for that very purpose. We meet together once a year and decide upon all such questions. We have been in existence now only three years and so we are not

fairly in working order, but that is the purpose of the association. I might say right here that in connection with the World's fair that is to be held in Chicago, the committee in Chicago consisting of Mr. Butterworth, Judge Boönor, and two other gentlemen have been in consultation with the executive committee of the agricultural colleges of the country in order to bring about a congress of the agricultural colleges of this country and of the world, in order that we may learn from them what we can with reference to agricultural education. I not only hope but believe that it will finally be of immense value to the country at large.

MR. LYMAN: I wished to know if it was at present doing what it ought to do. It was one of the strangest things to me why Congress did not provide for such harmony in the work. Way back in 1852 it appeared to me that was one of the essential things. It appeared to me that by that means the usefulness of colleges might be increased.

PROF. GOODELL: We have had a good deal of work on our hands in fighting our way. We have had to fight our way through Congress and elsewhere. You are doubtless aware that in almost every State there was, at the outset, a remarkable hostility to the colleges. Just at present we are engaged in carrying measures through Congress and in getting upon our feet.

PROF. BREWER: There is one point which I think is not appreciated, and that is the marvelous rapidity with which stations' work has sprung up. Where is there any other movement in the United States of any such magnitude, that has grown so rapidly? How long ago was it that the mass of farmers first knew anything about this work? Only a few years ago. And now they are in every State and territory of the Union; and it was simply impossible but what a good deal of experimental work had to be done and done separately by the different stations. A good deal of work was done that was not done in the best way. But I do think that experiment stations are getting better and agricultural colleges are working in better form. I think we are getting along pretty fast.

PROF. PETTEE: I want to say just a word. I might perhaps add to what Professor Goodell has said, that he is the president of our association at the present time. At the last meeting which was held at Champaign, Ill., New Hampshire had next to the largest representation of any State, and I am sure that the good that will result from having that large number of representatives and trustees present has been felt already through the State.

The object of this association, as President Goodell has said, is, first to get upon our feet; secondly, it is to result in bringing together the workers in our experiment stations and in a coöperation of the work. Of course there are difficulties in the way of bringing this about entirely. Each one in its own individual State has its own work to do and it is impossible to tie any particular State up to any international rule. It is found, however, that by getting together and talking over matters and directing as far as we can this coöperation of work, great good may be accomplished. To a certain extent quite a large amount of repetition is necessary on account of the different conditions that exist in different parts of the country.

PROF. BREWER: State laws also have something to do with it. A great part of the work that is done in these stations is done in obedience to specific laws. The State of Connecticut has a fertilizer law. At the time that law was passed in the State, the farmers came forward and testified that they were expending \$100 per acre per year on commercial fertilizers. The amount spent in a single township exceeded \$100,000 per year. We had to do something to protect ourselves against frauds. There was on the market at that time some goods that were utterly worthless, if not positively harmful. The state fertilizer law is of the kind that demands that the fertilizers shall be tested by the station. That makes a good deal of labor. Then there is the oleomargarine law, etc. There are frequently specific state laws which dictate in part the work to be done by the station. There is an enormous amount of work that could be done in coöperation, but the policy of the various state institutions

cannot be controlled, particularly where the States make liberal appropriations for their local institutions. I say that in explanation, because it has been inquired why there was not more coöperation.

MR. WALKER: I suppose we have arrived at the end of this session, and as far as I am concerned, I have been reluctant to get to this point. When I saw the programme that was handed to me by Mr. Bachelder and saw who were going to speak to us from abroad, I made up my mind that I would so arrange my affairs, if it were possible, that I might be here. I have been here during the last two days as much of the time as possible, and I have been packing away in my mental barrel as much of the solid meat as I could well salt down, and I intend to draw upon it hereafter.

There is one thing that is not on the programme that ought to be. I think that we owe something to these people from our neighboring States who have come in here and given us such valuable information. As I have listened to their papers, this thought has come into my mind: Supposing these gentlemen had come here twenty-five years ago and had read these same papers, how much of them should we have understood. It is a matter of great gratification to me that we have arrived at the point where we can understand and get some benefit from papers of this kind. If you go back twenty-five years I do not think that these papers would have been listened to.

I think that we owe these gentlemen, one and all, our hearty thanks, if nothing else. I hold in my hand a resolution which I have drawn up and I would like to present it to this meeting:

Resolved, That our thanks are due and are hereby tendered to the distinguished speakers from Massachusetts and Maine for the exceedingly valuable and interesting papers which they have read before this institute, and that copies of the same be solicited for publication in the transactions of our honorable Board.

The resolution was unanimously adopted.

MR. LYMAN: I wish to say just a word here. Last night I went to the room where they were having a hearing before the railroad committee, and the matter in dispute was the top of Mt. Washington. The hotel people wanted it, and the railroad wanted it, and there was a mighty contest going on between the two. It is considered, as I understand the matter, the most valuable piece of rock there is in New Hampshire. Yet in 1863, when I was first a member of the Legislature the question was raised incidentally as to who owned the summit of Mt. Washington. There seemed to be no means of knowing whether the State owned it or not. I was the only man in that Legislature that cared enough about it to get mad. No other person seemed to care whether New Hampshire owned it or not. Now it would be a fortune to anybody. I mention this to illustrate the growing prosperity of New Hampshire, as far as the tourist business is concerned, at least.

The session then adjourned.

GRAFTON COUNTY.

PIERMONT.

The Board held an institute at Piermont, March 13, at which were present President Humphrey, Vice-President Philbrick, Alonzo Towle of Freedom, F. P. Covell of Colebrook, and Secretary Bachelder.

The subjects discussed at the afternoon session were "Hay Production," by Mr. Covell and "Horse Breeding for Profit," by Dr. Towle. Each was followed by a discussion in which much interest was manifested. At the evening session President Humphrey spoke upon the subject of "Corn Growing," and Vice-President Philbrick, upon "The Dairy." The secretary participated in the discussion which followed. A deep interest in the institute was manifested by those in attendance and it was regarded as one of the most successful.

N. J. BACHELDER,
Secretary.



REPORT

OF THE

COMMISSIONER OF AGRICULTURE AND IMMIGRATION.

CONCORD, November 1, 1891.

To His Excellency the Governor :

Under date of January 1, 1890, a pamphlet was issued from this office in reply to many letters of inquiry received in regard to the abandoned farms of New Hampshire. This pamphlet briefly stated advantages to be derived by locating in our State, contained descriptions of abandoned farms for sale, and reached a circulation of eight thousand copies, being sent to every State in the Union, and even to several foreign countries. In August, 1890, one year from the commencement of this work, at our request a canvass was made by the selectmen of the towns in regard to the work accomplished, and the result published in our first report to the governor and council, under the date of August 12, 1890. In this report it was demonstrated that the results contemplated in the passage of the law under which this action was taken had, in a measure, been accomplished. Over three hundred vacant farms had become reoccupied, mainly by Americans for summer homes, and the summer boarding business largely increased through the means which had been employed.

Since this report was issued the work has continued and additional farms have become reoccupied; hundreds of letters of inquiry have been received.

The statement made in our previous pamphlet, that the

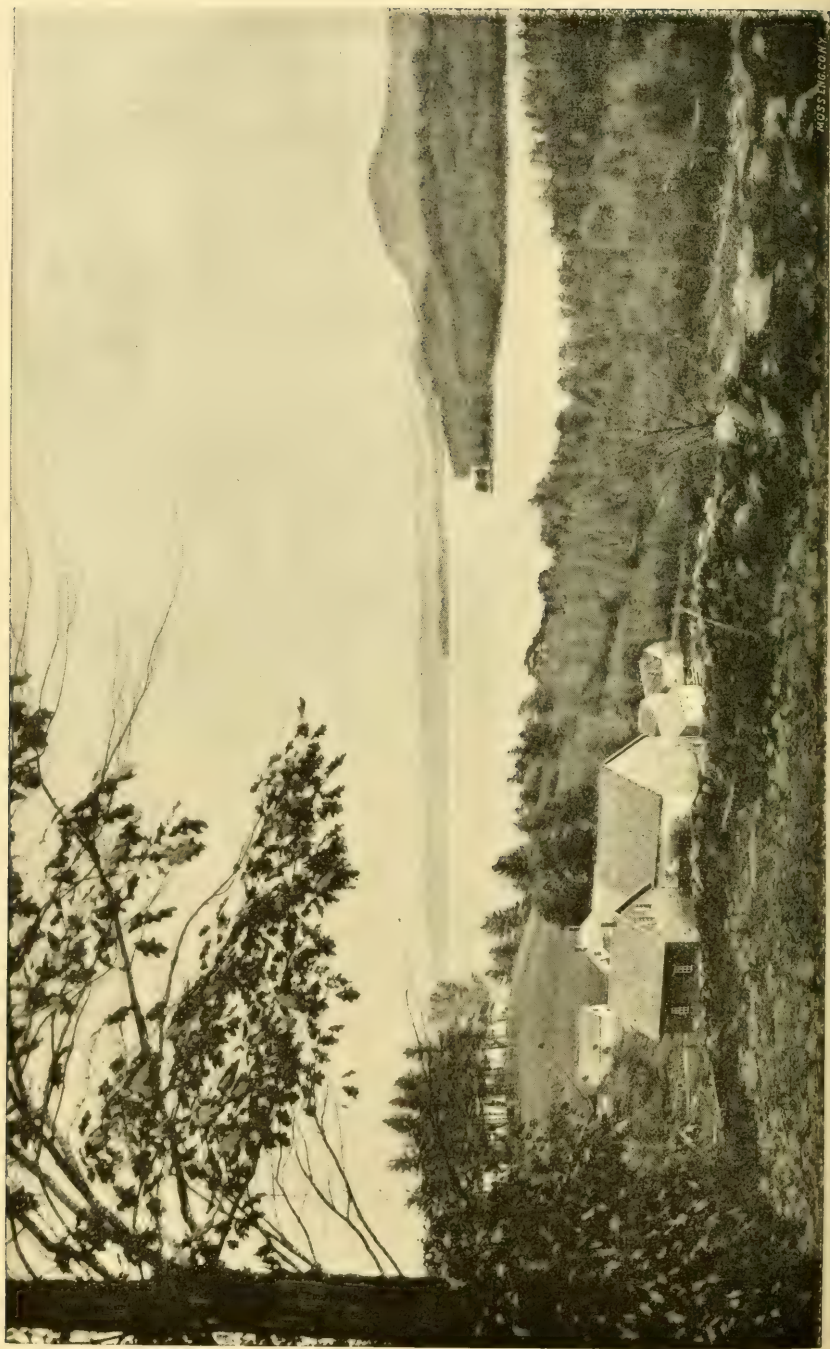
population of New Hampshire was annually increasing, has since been verified by the official census, giving the present population at 375,827, a gain of 30,000 since 1880.

The wealth of the State is annually increasing, and the advantages of a home in New Hampshire were never greater than to-day.

Our savings banks, the usual place of deposit of the surplus earnings of laboring people, have had a remarkable increase in deposits during the past year. By the report of the bank commissioners the aggregate deposits of the seventy-two savings banks, September 30, 1890, were \$65,727,019.04, an increase since the last report of \$8,426,428.56, the largest increase ever made in a corresponding period in the history of the savings banks of New Hampshire. In addition, the savings banks doing a general banking business and the trust companies showed on that date \$1,045,208.66 of savings deposits, giving a total of \$66,772,227.70 savings deposits in the savings banks and trust companies of the State. The total number of depositors was 159,782, and the average to each depositor was \$411.35. If the deposits of the savings banks were equally divided among the population of the State, the division would give to each individual \$175 in round numbers. The average last year to each depositor was \$395.12, and to each inhabitant, \$161.41

New Hampshire possesses a vast natural water power, and along the lines of our rivers and large streams have been built up some of the most thriving cities and villages in the world. These are continually adding to their business and wealth, and afford a constantly increasing market for farm products of all kinds. There are yet many undeveloped water powers within our State, which only need the investment of capital to build up still other manufacturing centres.

The educational advantages of New Hampshire are unexcelled, and the puritanical character of the people of our rural towns affords the most intelligent and exemplary society to be found anywhere. The healthfulness of our climate is well attested by the fact that fifty thousand people annually



MOSS AND CO. NY

NEW FOUND LAKE.

come from other States to spend the summer months within our borders for recuperation of body and mind.

Numerous agricultural organizations are zealously engaged in promoting more intelligent cultivation of the soil, and have elevated the business of farming from mere drudgery to that of an honorable and respected vocation. The variety of soil to be found in New Hampshire admits the culture of all farm and garden products adapted to this climate. Dairying is a leading branch of agriculture at the present time. Forty creameries, located in thirty-six towns, are making about three million pounds of butter annually, which is in good demand. New Hampshire dairy products now command a reputation in Boston market second to those of no other State. Several milk routes extend to various sections of the State, on which cars are run daily to Boston market with milk and cream.

Horse breeding is receiving much attention, and the demand for superior horses is now largely supplied by those of our own production.

The poultry business is a profitable farm industry, and many abandoned farms have already been utilized for this purpose.

In the production of fruit New Hampshire takes a prominent place among the States of the Union. New Hampshire grown apples have a national reputation, and are sought after in the foreign markets for superior quality and flavor.

There is a grand opening here for people desiring to engage in the summer boarding business, and many farms are specially desirable for this purpose. Fourteen hundred summer hotels and boarding-houses are annually filled to overflowing and are unable to accommodate the vast number that desire to spend the summer months among our granite hills. This industry brings to our State annually more than \$5,000,000. Thus it will be seen that the markets afforded by the manufacturing cities and villages, the summer boarding industry, the creameries and milk routes, all of which have been made more available by the recent extension of rail-

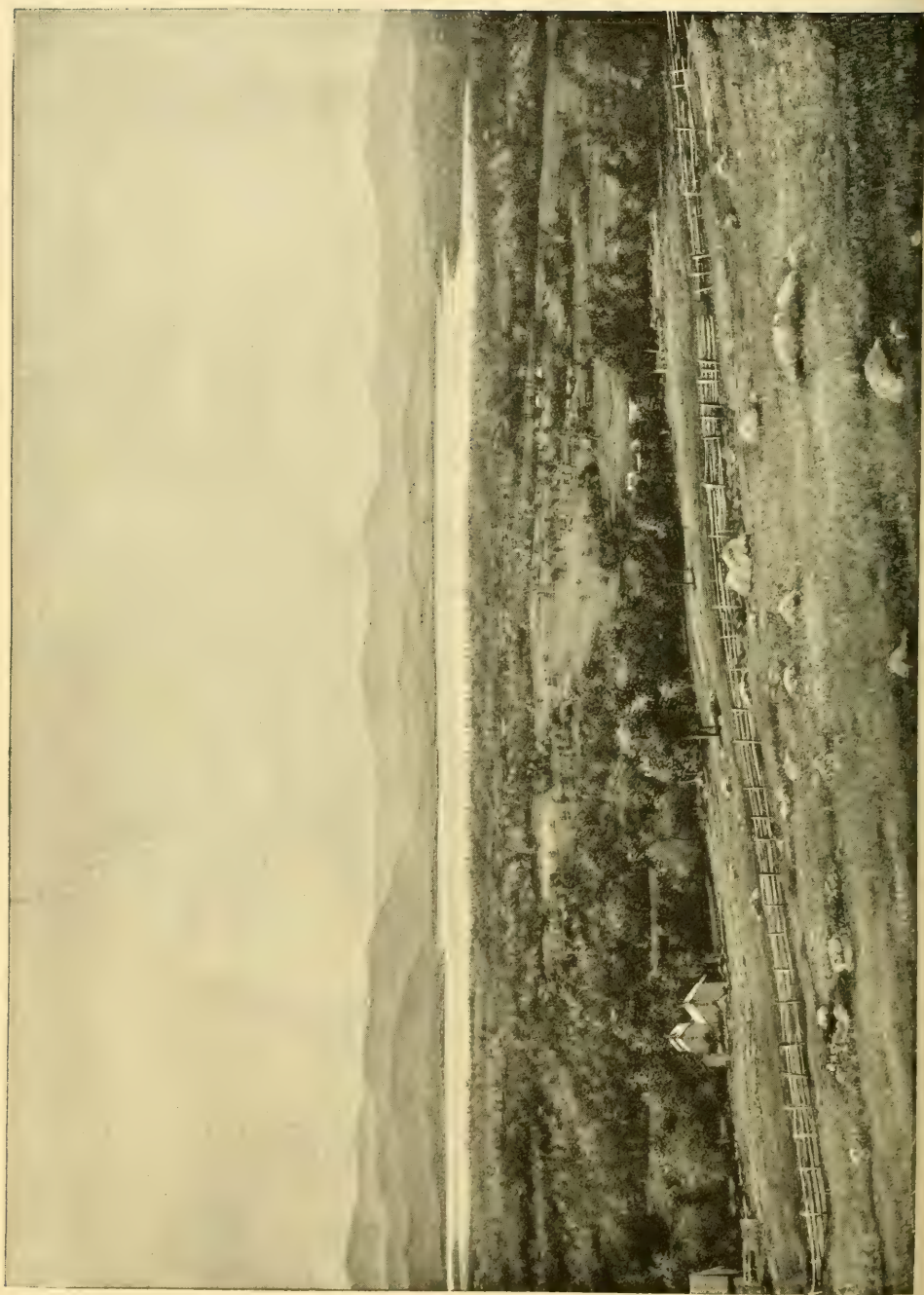
roads, render the farms of New Hampshire specially desirable for agricultural purposes.

Many of the farms taken up during the past year have been purchased by city people for summer homes, and many more will be taken in the future for this purpose. The buildings on many of them are large and roomy, and with little expense can be fitted for a delightful home during the summer months. Many of these farms are upon hilltops, commanding fine views of intervalles, ponds, and streams, and are surrounded with the grand New Hampshire mountains. Some of them are located upon the borders of lakes and ponds, where will be found most satisfactory rest and quiet, with fishing and hunting in abundance.

The State supports five fish hatcheries, from which during the past year 1,756,000 young trout, salmon, and bass were deposited in our lakes and streams.

In addition to the grand natural attractions of New Hampshire, the fame of which is world wide, there has been recently established in the central part of the State, by Austin Corbin, of railroad fame, one of the most extensive private parks in the country. Twenty-one thousand acres, embracing part of Croydon mountain, in Sullivan county, have been enclosed with a wire fence, and include the territory once divided into fifty farms. Within this inclosure have been let loose deer, caribou, moose, buffalo, and wild boar, in all about one hundred animals. Large additions will be made to this number, and this park will doubtless become an object of great curiosity to visitors. Ossipee Mountain park, in Carroll county, is being beautified by large expenditures of money, and embraces hundreds of acres in extent. Smaller estates, scattered all over our State, are being beautified and improved by recent purchasers, and the time is fast approaching when New Hampshire will be one grand park, leading all sections of our country in providing desirable homes, her hills and valleys having as wide a reputation as is now accorded her lakes and mountains.

No feature of New Hampshire scenery is more attractive



or affords more genuine pleasure to the summer tourist than the magnificent lakes and ponds within her borders. About six hundred in number, scattered over the length and breadth of the State, of varying size, shape, and altitude, they attract the summer visitors as nothing else can do. They have been so abundantly stocked with various species of game fish that they afford rare sport for the fisherman. On the large lakes elegant steamboats are run for business and pleasure parties, while the fleet of the smaller lakes and ponds includes smaller craft in great variety, from the trim canoe to the primitive raft.

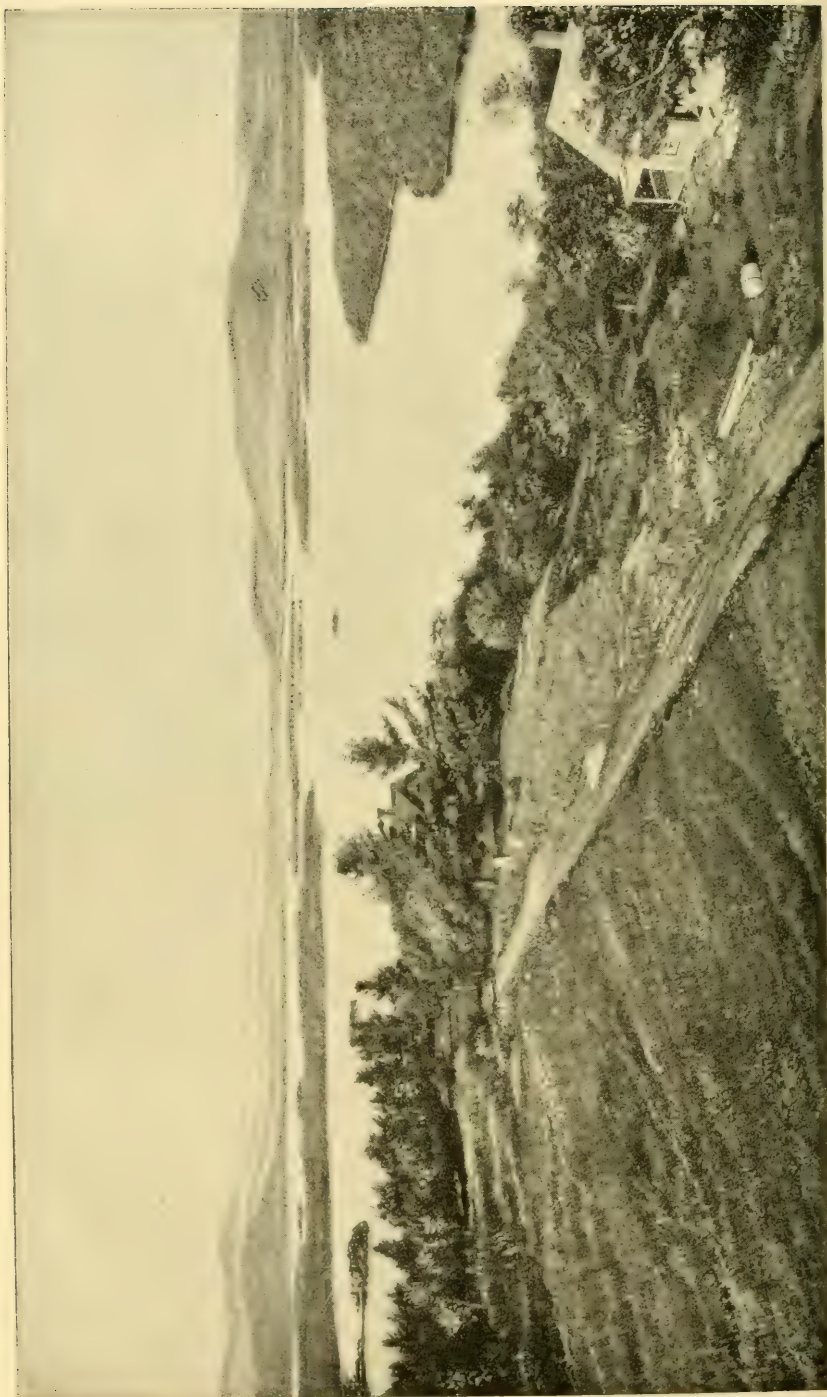
Cottages for summer homes are being built on the borders of these lakes. Densely wooded and rocky shores, dotted with attractive cottages, the only means of approach being by steamboat or canoe, afford an example of rural life which for rest and recuperation cannot be duplicated. Land for building purposes can be secured around these lakes for a trifling sum, and the cottages now built range in cost from one hundred to forty thousand dollars. Your attention is called by the illustrations in this pamphlet to the larger lakes of the State, around any of which a location can be secured. We are prepared to furnish the names of parties in any locality who will give definite information in regard to cost of land.

There are for sale in the State about one thousand vacant farms with tenantable buildings. Any one desiring a place in the country, either for agricultural purposes or for a summer home, has been invited to send for a catalogue containing descriptive list.

The list of summer hotels and boarding-houses herewith published will be found authentic, contains much valuable information in regard to this distinctive New Hampshire industry, and has been widely circulated. More than 17,000 pamphlets have been distributed during the past year.

SUMMER HOTELS AND BOARDING-HOUSES.

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
ACWORTH.			
H. R. Neal.....	Mountain View.....	Acworth.....	12
Mrs. Charles Allen.....	Sunset Hill Farm.....	".....	12
C. H. Blanchard.....	".....	".....	"
R. J. Carey.....	".....	".....	"
Abner G. Livingstone.....	".....	South Acworth.....	10
Mrs. Amelia Mitchell.....	Mitchell Residence.....	Acworth.....	6
Charles Humphrey.....	".....	".....	"
ALBANY.			
Mattie B. Davis.....	Front Dale.....	Albany.....	"
J. N. Piper.....	Bear Mountain.....	South Albany.....	25
J. N. Shackford.....	Shackford.....	Conway.....	10
Richard R. Hill.....	Hill House.....	".....	"
James Mayhew.....	Carrigan House.....	".....	12
Joseph Annis.....	".....	".....	8
David Hurley.....	Hillside Cottage.....	".....	12
ALEXANDRIA.			
E. T. Bailey.....	Goldenrod Farm.....	Alexandria.....	20
Calvin Brown.....	".....	".....	20
N. G. Smith.....	Mt. Cardigan Cottage.....	".....	14
Woodbury Sleeper.....	Elmwood Farm.....	".....	20
A. F. Cheney.....	Willowdale Farm.....	".....	6
G. A. Rollins.....	".....	".....	14
C. F. Wheet.....	".....	".....	"
ALTON.			
D. E. Wheeler.....	Winnipisogee Hotel.....	Alton Bay.....	80
George Craine.....	Hillside Cottage.....	".....	25
Mrs. Clara A. Gilman.....	Cottage Hall.....	Alton.....	"
Chester A. Twombly.....	Green Valley Lodge.....	Alton Bay.....	12
ALSTEAD.			
H. P. Chapin.....	Alstead House.....	East Alstead.....	30
G. G. Banks.....	Warren Pond House.....	" " ".....	20
A. M. French.....	Ledge Side.....	" " ".....	20
George E. Newman.....	Pine Cliff.....	" " ".....	"
Mrs. C. A. Partridge.....	".....	" " ".....	6
Fred Wright.....	".....	Alstead Centre.....	"
AMHERST.			
John Wallace.....	Maplewood.....	Amherst.....	"
Frank W. Noyes.....	Lake Shore.....	".....	15
William Colston.....	Baboosic.....	".....	20
Mary Putnam.....	Soda Spring House.....	".....	"
H. C. Day.....	Rockland House.....	".....	6
Pliny Odell.....	Walnut Hill House.....	".....	10
John H. Dodge.....	Idlewild.....	".....	15
S. B. Webster.....	Webster House.....	".....	16
William Melendy.....	Quoquinnapassakassan- anaguog.....	".....	30
A. S. Wilkins.....	".....	".....	10



ASQUAM LAKE. — HOLDERNESS.

SUMMER HOTELS AND BOARDING-HOUSES. — *Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
AMHERST. — <i>Continued.</i>			
Miss French.....		Amherst.....	10
F. L. Macomber.....	Pleasant View.....	Amherst Station....	20
M. S. Batchelder.....	Tumbleton.....		12
ANDOVER.			
H. C. Weymouth.....	Weymouth Farm.....	East Andover.....	
N. J. Bachelder.....	Highland Farm.....	".....	25
H. N. Burt.....	Maple Cottage.....	West Andover.....	25
F. H. Flanders.....	Hillside Farm.....	East Andover.....	18
F. G. Hersey.....		".....	
John F. Emerson.....		Andover.....	
Mrs. H. R. Fellows.....		".....	
Mrs. Susan D. Curtis.....		West Andover.....	
Jonathan Cilley.....		East Andover.....	
ANTRIM.			
A. B. Crombie.....	Windsor House.....	North Branch.....	
Milton Tenny.....	Antrim.....	Antrim.....	50
C. F. Holt.....	Lake House.....	".....	40
J. W. Bass.....	Willow Dale Farm.....	".....	12
Charles G. Griffin.....		North Branch.....	30
J. F. Tenney.....		Antrim.....	18
Mrs. Whitley.....		".....	
Mrs. L. Campbell.....		North Branch.....	
H. L. Lawrence.....		".....	12
John M. Duncan.....	Shady Knoll.....	Antrim.....	
L. T. Lovell.....		".....	8
George F. Perry.....	Pinnacle.....	".....	
H. W. Muzzey.....	Carter.....	".....	10
Mrs. J. R. Symes.....	Hill Side Farm.....	".....	20
Sam A. Holt.....	Tip-Top House.....	".....	
C. R. Jameson.....	Mountain Side Farm.....	".....	12
A. Colby.....	Mansion.....	Hillsboro' Bridge.....	15
ASHLAND.			
J. M. Cotton.....	Squam Lake House.....	Ashland.....	50
D. S. Batchelder.....	Batchelder House.....	".....	40
B. T. Mills.....	Seven Pines.....	Plymouth.....	
Mrs. E. J. Hughes.....		Ashland.....	16
B. F. Pease.....		".....	100
ATKINSON.			
William B. Keynolds....	Maple Farm.....	Atkinson.....	15
Wyman B. Knight.....	Maple Place.....	".....	12
James H. Noyes.....	High View.....	".....	8
Samuel P. Foote.....		Atkinson Depot.....	
George P. Dow.....		Atkinson.....	
Mrs. Harriet Fernald.....		".....	
Washington B. Wason.....		".....	
E. M. Carlton.....		".....	
AUBURN.			
Charles W. Calef.....	Calef Hotel.....	Auburn.....	50
Mary A. Murry.....	Hill Farm.....	".....	25
Charles J. Esty.....	Maple Cottage.....	".....	15
Benjamin Eaton.....	Eaton Hill Farm.....	".....	12
George W. Pingree.....	Mountain View.....	".....	20
Samuel Bradeen.....	Sheldon House.....	".....	12
Irving F. Grant.....		".....	
John Davis.....	Bunker Hill Farm.....	".....	20
BARTLETT.			
John Pendexter.....	Langdon House.....	Intervale.....	50

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
BARTLETT. — <i>Continued.</i>			
Pitman Brothers.....	East Branch House.....	Lower Bartlett.....	125
Frank George.....	Bartlett House.....	Bartlett.....	50
Mrs. C. C. Pendexter.....	Pendexter Mansion.....	Intervale.....	60
C. A. Tasker.....	Fairview.....	".....	.....
Mrs. H. A. Vickey.....	Pequawket.....	".....	.....
Walter Pitman.....	Pitman Hall.....	Lower Bartlett.....	100
C. Steiphen.....	Steiphen.....	Centre Bartlett.....	.....
E. A. Stevens.....	Cave Mountain House.....	Bartlett.....	.....
Joseph Mead.....	Centre Bartlett House.....	Centre Bartlett.....	40
BATH.			
William Symonds.....	Highland House.....	Bath.....	25
A. N. Blandin.....	Elmwood.....	".....	.....
Mrs. Hutchings.....	Old Stone House.....	".....	20
W. D. Thompson.....	Central House.....	".....	.....
Lucius Pierce.....	Elmwood.....	".....	20
C. W. & M. E. Jackman.....	.....	".....	.....
BELMONT.			
Stephen Taylor.....	Bay View.....	Laconia.....	50
Frank A. Randlett.....	Forest House.....	".....	35
P. Randlett.....	Randlett House.....	".....	25
A. J. Young.....	Belmont Cottage.....	East Tilton.....	24
Henry Thompson.....	Highland House.....	Laconia.....	.....
G. H. Ingalls.....	Brown's Hotel.....	Belmont.....	30
BENNINGTON.			
J. C. Dodge.....	Dodge Farm.....	Bennington.....	40
J. E. Favor.....	Highland House.....	".....	30
E. A. Holt.....	Holt Farm.....	".....	20
B. D. Felch.....	.....	".....	20
BENTON.			
E. B. & E. F. Mann.....	Tip-Top House.....	Benton.....	.....
Mrs. C. C. Taylor.....	Breezy Hill Farm.....	".....	10
O. L. Mann.....	.....	".....	.....
C. A. Veasey.....	Veasey Cottage.....	".....	10
C. B. Keysar.....	.....	".....	6
Mrs. George Daginon.....	.....	".....	.....
BERLIN.			
H. F. Marston.....	Berlin House.....	Berlin Falls.....	75
C. C. Knapp & Son.....	Winslow House.....	Berlin.....	.....
BETHLEHEM.			
Ainslie & Webster.....	Maplewood Hotel.....	Maplewood.....	400
John Hopkins.....	Avenue House.....	Bethlehem.....	300
C. H. Davis.....	Maplewood Cottage.....	Maplewood.....	100
J. N. Turner & Son.....	Turner House.....	Bethlehem.....	75
Durgin & Co.....	Sinclair House.....	".....	300
A. J. Phillips.....	Prospect House.....	".....	80
D. W. Ranlett.....	Ranlett House.....	".....	75
David Phillips.....	Bellevue House.....	".....	85
— Eastman.....	Tamarack Cottage.....	".....	.....
R. M. Hodgdon.....	Elm House.....	".....	.....
J. B. Bear.....	Georgia Cottage.....	".....	20
F. P. Moulton.....	Bethlehem House.....	".....	.....
Mrs. S. P. Swett.....	Swett Cottage.....	".....	.....
R. H. Gardner.....	Gardner Cottage.....	".....	.....
Mrs. D. F. Davis & Son.....	Hillside.....	".....	50
A. W. Blandin.....	Blandin House.....	".....	30
H. Nye.....	Mount Agassiz.....	".....	.....
W. H. Presby.....	Woodlawn House.....	".....	25



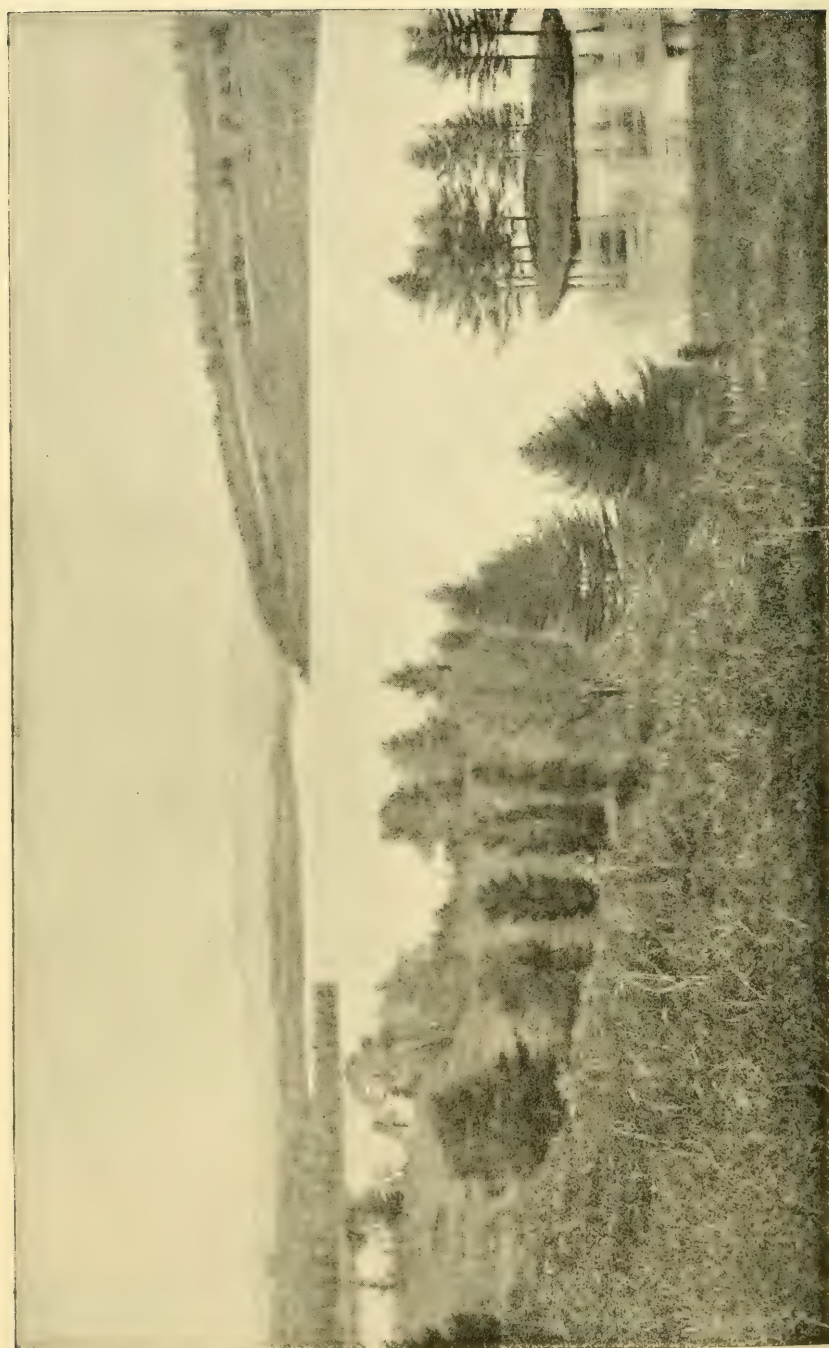
MASCOMA LAKE.—ENFIELD.

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Chairs.
BETHLEHEM.—<i>Cont'd.</i>			
I. A. Taylor.....	Mountain View.....	Bethlehem.....	20
F. H. Abbott.....	The Uplands.....	".....	100
J. H. Clark.....	Highland House.....	".....	
C. H. Clark.....	Alpine House.....	".....	60
L. M. Knight.....	Centennial House.....	".....	60
A. S. Phillips.....	Farm Cottage.....	".....	
G. A. Gilman.....	Garfield Cottage.....	".....	12
Mrs. F. Glazier.....	The Vista.....	Littleton.....	15
F. E. Derkshire.....	Howard.....	Bethlehem.....	
G. L. Gilmore.....	Broad View.....	".....	
J. K. Barrett.....	Strawberry Hill House..	".....	
C. L. Bartlett.....	Mt. Washington House..	".....	70
H. E. Smith.....	Echo Cottage.....	".....	
B. Tucker.....	Park Cottage.....	".....	
G. W. Smith.....	East View House.....	".....	
E. R. Thompson.....	Prospect Cottage.....	".....	26
Mrs. Padelford.....	Idlewild Cottage.....	".....	
F. L. White.....	Plummer Cottage.....	".....	
A. Spring.....	Greenfield House.....	".....	
BOSCAWEN.			
Hanibal Bonney.....	Penacook House.....	Penacook.....	30
Henry Coffin.....	Chestnut Farm.....	Boscawen.....	
C. W. Keniston.....	Hillside Farm.....	".....	25
Henry Ferrin.....	Hillside Farm.....	".....	6
Samuel Choat.....	".....	".....	
Jacob Hosmer.....	".....	".....	
BOW.			
George W. Colby.....	".....	Bow Centre.....	
J. S. Austin.....	Chatagee.....	North Bow.....	10
BRADFORD.			
George A. Smith.....	Bradford House.....	Bradford.....	
Charles Gillis.....	Gillis.....	".....	60
Henry McCoy.....	Bradford Springs.....	East Washington...	150
Addison S. Cressey.....	Meadow Brook Farm.....	Bradford.....	25
Greeley M. Cressey.....	Sunny Side.....	".....	20
Anson S. Dill.....	".....	".....	
Sarah P. Morse.....	".....	".....	20
George B. Andrews.....	Hillside Farm.....	".....	20
L. B. Butman.....	Butman House.....	".....	20
H. C. Felch.....	Hill Rest.....	".....	10
Mrs. C. E. Hadley.....	".....	".....	10
F. H. Patch.....	".....	".....	10
Albert Larkin.....	".....	".....	
BRENTWOOD.			
John A. Rowell.....	".....	Exeter.....	15
Addison B. Rowell.....	".....	".....	25
Peter Davis.....	".....	Brentwood.....	10
E. G. Brackett.....	".....	".....	12
Miss Emma Sinclair.....	".....	".....	
Mrs. E. E. Thompson.....	Thompson Farm.....	".....	6
BRIDGEWATER.			
William A. Sawyer.....	Lake View.....	Bridgewater.....	75
D. Y. Fifield.....	Bay View.....	".....	50
Mrs. Orrin L. Dolloff.....	Elm Lawn.....	".....	25
G. B. Dolloff.....	".....	".....	14
Hiram S. Tilton.....	".....	".....	

SUMMER HOTELS AND BOARDING-HOUSES. — *Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
BRISTOL.			
M. F. Wilber	Bristol House	Bristol	100
E. T. Pike	Maple Cottage	"	12
S. S. Brown	Newfound Lake Farm	"	25
J. H. Ackerman	Pine Grove Farm	"	12
Mrs. R. S. Young	Florence Cottage	"	10
BROOKFIELD.			
Henry W. Peavey	Moose Mountain Cottage	Wolfeboro' Junction.	
John W. Prescott .....	.....	Union.	
Jonathan W. Sanborn	Pine Grove Farm	Wolfeboro' Junction.	
BROOKLINE.			
C. L. Forbes	Brookline House	Brookline	
Mrs. L. P. Peabody	Elmwood House	"	
N. W. Colburn .....	.....	" .....	8
James S. Cox .....	.....	.....
CAMPTON.			
J. C. Blair	Blair Hotel	Blair	65
E. H. Sanborn	Sanborn House	West Campton	130
C. H. Sprague	Sunset Hill House	Campton Village	50
Sawyer & Marvell	Hillside	"	45
C. H. Damon	Highland House	"	
A. B. Cook	Maplewood House	"	20
C. G. Avery	Maples	Campton	25
G. S. Bartlett	Three Elms	"	20
F. P. Hart	Willey House	Campton Village	10
T. S. Pulsifer	Cottage Farm	Plymouth	10
S. S. Mitchell	Bald Hill House	"	10
S. F. Hill	Hills Cottage	"	16
D. B. Pulsifer .....	.....	" .....	8
CANAAN.			
Sawyer & Trull	Jerusalem Springs House	Canaan	50
Mrs. David Whittier	Pinnacle House	Canaan Street	50
Henry Martin	Twin Cottages	"	30
H. B. Tenney	Sunset House	"	25
A. D. Howe .....	.....	" .....
H. W. Miller .....	.....	" .....
Mrs. Gilbert Spencer	Prospect Farm	"	20
CANDIA.			
Thomas B. Turner .....	.....	Candia	
Jesse M. Sargent .....	.....	" .....
Mrs. G. Lang .....	.....	" .....
Mrs. Gilchrist .....	.....	" .....
William Patten .....	.....	" .....
F. D. Rowe	Rockdale Cottage	"	10
Frank W. Eaton	Highland View	"	25
CANTERBURY.			
George Fletcher	Hancock House	Canterbury	30
O. W. Dow	Pippo House	East Canterbury	12
George Gale	The Maples	Canterbury	25
John H. Batchelder .....	.....	" .....	6
A. B. Lovering	Lovering	"	20
Edwin B. Peverly	Peverly Farm	"	20
Leone J. Chase	Osgood House	"	25
Jonathan C. Greenough	Picturesque Retreat	"	15
Myron C. Foster	Hillside Farm	"	10
Joseph R. Hancock	Canterbury House	Upland	50
J. P. Dearborn	Elm Cottage	Canterbury	



PENACOOK LAKE.

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
CARROLL.			
Barron & Merrill	Crawford Hotel	Crawford Hotel	450
F. A. Cofran	Twin Mountain Hotel	Twin Mt. Hotel	300
Barron & Merrill	Fabyan Hotel	Fabyan's	250
Barron & Merrill	Mount Pleasant Hotel	Mt. Pleasant Hotel	400
S. W. Kelley	Mount Martha	Twin Mt. House	25
Charles S. Miles	Pleasant View	" "	20
Dora Chase	Chase Cottage	" "	20
R. D. Rousevel	White Mountain House	" "	150
Barron & Merrill	Summit House	Mount Washington	250
H. E. Jenness	Elmwood Hall	Twin Mts.	25
CENTRE HARBOR.			
J. L. Huntress & Son	Senter House	Centre Harbor	150
S. F. Emery	Moulton House	" "	75
Benjamin F. Kelsea	Locust Cottage	" "	25
David W. Cram	Grampian House	Meredith	30
Mrs. Rhoda A. Benson	Elm House	Centre Harbor	30
David M. Whitcher	"	" "	25
Dr. William A. Page	"	" "	12
A. W. Canney	Grand View Cottage	Meredith	12
Henry C. Sturtevant	Sturtevant Farm	Centre Harbor	12
Stephen Wentworth	Willow Cottage	" "	12
Mrs. B. F. Wentworth	Brown Cottage	" "	25
George Sturtevant	Elm House	" "	8
J. B. Greene	Sunny Side Cottage	Moultonborough	20
Mrs. F. F. Greene	Red Hill Cottage	Centre Harbor	14
Mrs. Alonzo Perkins	Pine Hill Cottage	Meredith	14
CHARLESTOWN.			
C. S. Symonds	Eagle Hotel	Charlestown	50
Mrs. T. S. Evans	Evans House	" "	20
Horace Kimball	Elm House	" "	14
Mrs. F. W. Harris	Harris House	" "	8
Mrs. A. C. May	Maplewood	" "	4
CHATHAM.			
Charles S. Chandler	Chandler's Cottage	North Chatham	12
Dana Hill	"	South Chatham	10
D. O. Pickering	"	" "	4
Thomas Smith	"	" "	4
CHESTER.			
Samuel L. Marston	Emerson Hotel	Chester	40
Albert J. Merrill	Merrill House	East Chester	20
Mrs. Henry A. Hall	"	" "	20
Addison A. Bean	"	Chester	14
Horace E. True	Riverside Farm	Raymond	30
Frank E. Leighton	Highland House	Chester	12
George Hook	"	" "	12
John A. Hezelton	"	East Chester	10
Mrs. Edward Hezelton	"	" "	10
Barnard P. Robie	"	Chester	10
George N. West	Willowdale Cottage	" "	6
Willis S. Merrill	Orchard Farm	" "	6
Henry Moore	"	" "	6
CHESTERFIELD.			
A. R. Mason	Prospect House	Keene	100
J. H. Goodrich, 2d.	Lake View	Chesterfield	50
Dunton & Faro	Lakeside	Brattleborough, Vt.	75
Luther Plumer	Woodside	" "	75
Mrs. L. F. Bonney	"	Chesterfield	75

SUMMER HOTELS AND BOARDING-HOUSES. — *Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
CHICHESTER.			
Elijah B. Young		Chichester Centre	8
S. Ambrose Brown		Pittsfield	
Ira Sanborn		Chichester Centre	
CLAREMONT.			
Underhill & Bean	Belmont Hotel	Claremont	50
H. C. Fitch & Son	Sullivan House	"	70
C. M. Leete		"	
Lyman Fitch		"	10
G. A. Andrews		"	20
J. W. Chapin	Hillside Farm	"	10
R. B. Tull		"	
A. R. Campbell		"	30
COLEBROOK.			
T. G. Rowan	Monadnock	Colebrook	100
Daniel Rowan		"	40
S. B. Whittemore		"	
W. H. Milliken		"	
Addie Lyman		"	
Davis Graham	Mountain View	"	16
Addison Corbitt	Maple Cottage	"	14
Mrs. W. T. Phillips	The Elms	"	12
CONWAY.			
Recker & Hartshorn	Kearsarge Hotel	North Conway	250
Russell Brothers	Russell House	Kearsarge	135
S. Mudgett & Sons	Intervale	Intervale	300
M. L. Mason	Sunset Pavilion	North Conway	150
Dow & Hill	Ridge	Kearsarge	100
Alfred Eastman	Eastman	North Conway	90
L. J. Ricker	North Conway House	"	75
L. L. Blood & Son	Conway House	Conway	100
Augustus Eastman	Arlet Falls		
L. Wheeler & Son	Orient	Kearsarge	40
F. L. Plummer	McMellan	Conway	100
J. T. Randall	Randall	"	75
T. C. Eastman	Moat Mountain	North Conway	30
Mrs. L. A. B. Jaffrey	Jaffrey	"	40
G. F. Wolcott	Edgewood Cottage	"	20
Dinsmore Brothers	Idlewild	Intervale	50
Mrs. S. D. Pendexter	Pendexter House		
David Wakefield	Dundee Mountain	Conway Centre	25
G. A. Heath	Heath Cottage	Conway	15
O. W. Merrill	Merrill House	"	20
J. D. Stott		Conway Centre	
J. F. Stott	Atherton Farm	"	25
J. P. Palmer		Conway	
J. A. Barnes & Sons	Bellevue	Intervale	75
G. W. Marden	Pine Grove	Conway	20
R. D. Litchfield	Center Villa	"	
D. F. Pendexter	Pequawket Hotel	"	
L. D. Mills		Conway Centre	
E. R. Perkins	Perkins Farm	"	12
David Putnam	Putnam Cottage	"	10
C. H. Leavitt	Birch Hill Castle	Snowville	8
CORNISH.			
A. L. Peters	Valley House	Windsor, Vt.	
George F. Watts	Hampshire	Cornish Flat	20
J. W. Pierce	Fairview	South Cornish	20
Alfred Fitch	Dingleton	Windsor, Vt.	8
Albert Weld	Maple Cottage	Cornish Flat	6



SILVER LAKE. — HARRISVILLE.

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
CORNISH. — <i>Continued.</i>			
S. A. Tracy	Maplewood Farm	Plainfield	10
W. B. Quimby .....	.....	Cornish Flat	6
J. W. Fitch .....	.....	Windsor, Vt.	6
F. L. Johnson	Sunnyside	Cornish Flat	6
Charles H. Deming .....	.....	.....	.....
CROYDON.			
David A. Sargent	Croydon House	Croydon	20
Isaac P. Rawson .....	.....	" .....	.....
John Harding .....	.....	.....	.....
DALTON.			
William B. Aldrich	River View House	Dalton	15
DANBURY.			
G. B. Pulsifer	Pulsifer House	Danbury	12
G. H. Wiggins .....	.....	" .....	12
J. A. Jackson	Jackson House	"	15
G. H. Jackson	Woodbine Cottage	"	20
Mrs. J. O. Gale	Danbury House	"	20
A. J. Danforth .....	.....	" .....	15
E. B. Nichols	Long Look Farm	"	30
J. D. Danforth .....	.....	" .....	.....
Fred Huntoon	Farland Vale House	"	10
Mrs. S. D. Tuck	Homestead Farm .....	.....	20
DEERFIELD.			
H. B. Stearns .....	.....	South Deerfield	10
G. Page	Exchange Hotel	Deerfield .....	.....
Walter Scott	Pleasant Pond	Epsom	12
J. D. Cate .....	.....	Deerfield	15
Annie M. Chase .....	.....	Deerfield Centre .....	.....
DEERING.			
A. L. Danielson	Bellevue Hotel	Deering	35
Levi W. Goodale	Orchard House	"	25
Esther P. Crosby	Highland House	"	16
William Forsaith .....	.....	Deering Centre	10
Dennis R. Chase	Maplewood House	East Deering	20
William H. Gilmore	Riverside	"	16
Mrs. Jesse Gregg	Lake View House	Deering Centre	10
R. E. Otis .....	.....	Hillsboro' Bridge .....	.....
DERRY.			
A. T. Willey	Bradford Hotel	Derry Depot .....	.....
Albert Newell	Hildreth Hall	Derry	40
William O. Noyes	Noyes Farm .....	.....	20
Miner G. Frye	Frye House	Derry Depot .....	.....
George A. Webster	Grand View .....	.....	12
Joshua B. Morse	Pawtucket Farm	Derry .....	.....
M. Cullen	Maplewood Farm	East Derry	10
Walter D. Stevens	Stevens Farm .....	" .....	.....
George W. Batchelder	Batchelder Farm	"	25
Albert A. Davis	Davis Farm	East Windham .....	.....
Mrs. William Merrifield	Buttonwood Farm	East Derry	6
Mrs. William Reynolds .....	.....	" .....	.....
H. J. Bagley	Lakeside	Derry Depot .....	.....
Joseph Frost	Frost Mansion	Windham Depot .....	.....
James M. Batchelder	Valley House	East Derry	10
Mrs. John Burbank	Thomas House .....	" .....	.....
DORCHESTER.			
William Buck	Daisy Farm	East Canaan	12

SUMMER HOTELS AND BOARDING-HOUSES. — *Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
DUBLIN.			
H. R. Leffingwell	Appleton House.....	Dublin.....	75
Miss B. Esty.....	Parkhurst.....	".....	..
DUMMER.			
J. H. Chandler.....	.....	Dummer.....	..
Blanchard & Twitchell..	.....	".....	..
DUNBARTON.			
Daniel Jameson.....	Maple House.....	Dunbarton.....	30
Henry P. Kelley.....	Centre View.....	".....	10
N. T. Safford.....	.....	".....	..
E. P. Marshall.....	.....	".....	..
DURHAM.			
J. M. R. Adams.....	Adams House.....	Newmarket.....	20
N. A. Pendergast.....	.....	".....	6
N. G. Wiggins.....	Oak Grove.....	".....	12
J. G. Hutchinson.....	.....	".....	..
Mrs. Martha D. Young..	Young Farm.....	".....	10
D. T. Woodman.....	.....	".....	..
John H. Scott.....	.....	".....	..
EAST KINGSTON.			
Ernest G. Currier.....	.....	East Kingston.....	26
EATON.			
N. G. Palmer.....	Palmer House.....	Eaton Centre.....	32
J. N. Robertson.....	Robertson House.....	".....	20
Stephen Littlefield.....	.....	Snowville.....	12
H. H. Robertson.....	Rock Mountain.....	Eaton Centre.....	25
William N. Snow.....	.....	Snowville.....	..
F. M. Hatch.....	.....	".....	8
C. H. Leavitt.....	.....	".....	..
Mrs. E. A. Stanley.....	Riverside House.....	".....	8
EFFINGHAM.			
John C. Leavitt.....	Green Mountain House..	Effingham.....	..
James H. Smith.....	.....	".....	..
Shepard F. Demeritt.....	.....	Effingham Falls.....	..
Sylvester T. Lougee.....	.....	".....	..
Joseph B. Davis.....	.....	".....	..
Mary E. Marston.....	.....	".....	..
Almon Cross.....	.....	".....	..
Charles B. Savage.....	.....	South Effingham.....	..
Charles H. Stevens.....	.....	".....	..
Samuel Clough.....	Glenwood House.....	".....	18
John A. Leavitt.....	.....	Centre Effingham.....	..
James F. Cate.....	Locusty Cottage.....	".....	6
Willard L. Meloon.....	.....	Ossipee.....	..
ENFIELD.			
George L. Hart.....	.....	Enfield.....	..
Lorenzo Day.....	Day Dawn.....	".....	40
William A. Saunders.....	Lake View.....	".....	30
John Morse.....	Mont Calm.....	".....	40
T. B. Morgan.....	Maple Grove.....	".....	12
William W. French.....	Maple Cottage.....	".....	12
James Jackman.....	Elm Cottage.....	Enfield Centre.....	20
A. P. Howe.....	Mountain View.....	Lebanon.....	15
C. H. Webster.....	Webster House.....	Enfield.....	30
F. B. Morse.....	Codman House.....	Enfield Centre.....	40
E. R. Dustin.....	Sunrise House.....	".....	12



HIGHLAND LAKE. — ANDOVER.

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
EPPING.			
Moses A. Perkins	Prospect House	Epping	30
L. D. Manville	Pawtuckaway	"	6
G. O. Reynolds	"	"	
Mrs. Ladd	"	"	
Mary Plummer	"	"	
ERROL.			
W. A. Bragg	Umbagog	Errol	50
John Akers	Akers House	"	15
L. H. Grover	Grover House	"	
G. C. Demeritt	Demeritt House	"	
J. W. Akers	Pond Cottage	"	15
FARMINGTON.			
E. T. Cotton	Wilson House	Farmington	50
William Welch	Central House	"	
Frank McAlpine	Strafford House	"	30
Park J. Connelly	Connely Farm	"	25
John S. Roberts	Cloverdale Farm	"	30
FRANCESTOWN.			
A. H. Spalding	Francestown Hotel	Francestown	30
F. A. Prescott	Mountain Farm	"	20
N. H. Woods	"	"	
Mrs. P. L. Clarke	"	"	12
FRANKLIN.			
Mrs. O. B. Davis	Webster House	Franklin	
A. K. Moore	Franklin House	"	15
James Morse	Morse Cottage	"	8
Hiram Colby	"	"	
P. L. Kennedy	"	Franklin Falls	
Robert Young	"	"	
Nathaniel Colby	"	"	
Miss Minnie Cram	"	Franklin	
Albert M. Osgood	"	Franklin Falls	
FITZWILLIAM.			
O. K. Wheelock	Cheshire House	Fitzwilliam	150
O. K. Wheelock	Fitzwilliam Hotel	"	150
N. W. Cahill	"	"	
FRANCONIA.			
Taft & Greenleaf	Profile House	Profile House	500
Priest & Dudley	Forest Hill House	Franconia	150
Richardson Brothers	Mount Lafayette	"	75
M. B. Wheelock	Hawthorne	"	60
Alvin Granis	Mount Jackson	"	30
John M. Bickford	Maple Farm	"	12
W. H. Weisman	White Mountain Studio	"	
James Quimby	"	"	20
Henry Spooner	"	"	25
Mrs. Noah Wells	Grand View Cottage	"	14
Daniel Whitney	"	"	20
Edwin Nelson	Brooks Farm	"	25
Mrs. H. Knight	Mountain View	"	30
FREMONT.			
Warren True	True House	Fremont	
Andrew Brown	"	"	
Joseph B. Sanborn	"	"	10

SUMMER HOTELS AND BOARDING-HOUSES. — *Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
FREEDOM.			
William Furbush.....	Loon Lake.....	Freedom.....	16
Mrs. R. Towle.....	.....	".....	.....
S. W. Fowler.....	Wayside Farm.....	".....	20
Mrs. Marcia Danforth.....	.....	".....	.....
Fred Huntress.....	Prospect House.....	".....	10
C. P. Danforth.....	.....	".....	.....
Mrs. Joseph Towle.....	.....	".....	.....
Hittie Andrews.....	.....	".....	.....
Mrs. C. P. Harmon.....	.....	".....	.....
Frank Tyler.....	Elm Farm.....	".....	10
O. E. Drake.....	.....	".....	.....
GILMANTON.			
John L. Stoddard.....	Mountain View.....	Gilmanton.....	.....
A. R. Wight.....	.....	".....	30
R. A. Knowles.....	.....	".....	20
Mrs. Eunice Holbrook.....	.....	".....	.....
L. H. Mudgett.....	.....	".....	10
J. H. Drew.....	Mount Oakland House.....	".....	10
Mrs. Emma Demett.....	.....	.....	.....
Stephen W. Sargent.....	Hill Rest.....	Gilmanton Iron W'ks.....	20
E. A. Paige.....	Crystal Lake.....	".....	20
Mrs. Charles A. Hatch.....	Rock View House.....	Gilmanton.....	18
Lafayette Canney.....	Hillside Farm.....	".....	15
Charles W. Munsey.....	.....	".....	.....
Mrs. Mary A. Nutter.....	.....	".....	.....
GILFORD.			
Hunt Bros.....	Winnette.....	Lakeport.....	25
J. H. Davis.....	Lily Pond.....	.....	25
L. M. James.....	.....	Laconia.....	15
E. M. Brown.....	Pleasant Valley.....	Lakeport.....	10
Ellen E. S. Wadleigh.....	.....	Weirs.....	15
F. G. Smith.....	Prospect House.....	Laconia.....	10
Henri Blaisdell.....	Lake Shore Park Inn.....	Lakeport.....	.....
Palmer W. Merrill.....	.....	".....	.....
A. O. Sanborn.....	.....	".....	.....
GOFFSTOWN.			
S. D. Johnson.....	Shirley Hill House.....	West Manchester.....	70
H. S. Scribner.....	Scribner House.....	Goffstown Centre.....	.....
George Brothers.....	Yacum.....	".....	60
Mr. White.....	Central House.....	Goffstown.....	.....
H. L. Kimball.....	Maplewood House.....	Manchester.....	25
Daniel Shirley.....	Shirley Hill Farm.....	West Manchester.....	15
Daniel Davis.....	.....	Goffstown.....	.....
Horace Richards.....	.....	".....	.....
GORHAM.			
G. D. Stratton.....	Alpine.....	Gorham.....	.....
L. L. Jackman.....	Eagle Hotel.....	".....	40
Mrs. F. H. Evans.....	Willis Cottage.....	".....	35
Mrs. E. C. Spafford.....	Riverside.....	".....	.....
Ann Lary.....	Lary House.....	".....	.....
GOSHEN.			
Mrs. G. H. Brown.....	.....	Mill Village.....	.....
H. S. George.....	.....	".....	.....
Edwin Pettis.....	.....	".....	.....
George Davis.....	.....	".....	.....
Elmer Jacobs.....	.....	".....	.....
Joel S. Maxfield.....	.....	Goshen.....	6



SPOFFORD LAKE. — CHESTERFIELD.

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
GREENFIELD.			
John D. Emmon .....	.....	Greenfield .....	.....
GREENLAND.			
Dudley C. Littlefield	Mansion House	So. Newmarket Jc. ..	14
Phillip B. Holmes .....	.....	Greenland .....	.....
GREENVILLE.			
W. A. Robinson	Columbian	Greenville	40
E. B. Barrett	Barrett House	"	12
HAMPSTEAD.			
A. P. Emerson	Hawthorn Lodge	Hampstead	2
Hannah B. Griffin .....	.....	" .....	.....
W. H. Cobb	Mapleton House	"	8
Amasa Hunt	Maple Cottage	"	12
Frank Bigelow .....	.....	" .....	12
John W. Marble	Valley Farm	"	20
HAMPTON.			
S. H. Dumas	Boar's Head	Hampton	200
S. H. Dumas	Rockingham House	"	60
Leavitt Brothers	Hampton Beach House ..	" .....	.....
Otis H. Whittier	Union House	"	75
John G. Cutler	Sea View	"	50
Curtis D. DeLancey	De Lancey House .....	" .....	.....
Lewis P. Nudd	Eagle House	"	60
Joseph J. Mace .....	.....	" .....	25
Josiah C. Palmer .....	.....	" .....	.....
Thomas L. Perkins .....	.....	" .....	12
Elias S. Perkins .....	.....	" .....	10
Oliver Nudd .....	.....	" .....	.....
Mrs. Simon Leavitt	Elm Cottage	"	25
Austin Weare	Lancey	Seabrook .....	.....
Frank Beckman	Beckman House	Hampton .....	.....
Mrs. J. J. Leavitt .....	.....	" .....	.....
Jacob E. Leavitt .....	.....	" .....	.....
Frank Nudd	Nudd House	"	40
HAMPTON FALLS.			
John A. Brown .....	.....	Hampton Falls	10
Mrs. J. A. Dow .....	.....	" .....	8
Mary E. Elkins .....	.....	" .....	.....
HANCOCK.			
A. S. Wood .....	.....	Hancock .....	.....
Helen Fowle .....	.....	" .....	.....
J. F. Eaton	Hancock House	"	40
John Welch .....	.....	" .....	.....
A. B. Stone	Maple Dale Farm	"	20
A. G. Foster .....	.....	" .....	.....
Lydia Osgood .....	.....	" .....	10
John Lindsay	Lindsey Farm	"	20
HANOVER.			
Dartmouth College	Wheelock House	Hanover	150
George W. Kibling	Dartmouth House	"	100
HARRISVILLE.			
James A. Mason	Grand View	Chesham	15
L. L. Howe .....	.....	" .....	.....
M. M. Mason .....	.....	" .....	12
Aaron Willard .....	.....	" .....	.....
Solon Willard .....	.....	" .....	.....

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
HART'S LOCATION.			
L. F. Atwood.....	Willey House	Crawford House.....	60
HEBRON.			
E. Barnard	Lakeside	East Hebron.....	24
John W. Sanborn	Grove Hill Farm.....	"	25
Fred Clement	Union House	Hebron .....	.....
Cyrus Moore	Central House .....	" .....	.....
Geo. S. Smith	Hillside Farm.....	East Hebron.....	25
Hiram M. Worthley	Prospect House	Bridgewater.....	15
John E. Hartford	Maplewood Farm	East Hebron.....	12
HENNIKER.			
G. W. Miller	Hotel Henniker	Henniker.....	30
Charles Ray	Lake View Farm.....	"	12
J. B. Brown	Pleasant Lake Farm.....	"	16
Henry F. Huntington	Mountain View	"	12
D. W. Cogswell	"	"	12
J. A. Newton .....	" .....	" .....	.....
Warren Felch .....	" .....	" .....	.....
Mrs. C. R. Bacon	Fir Tree Cottage	"	8
Fred N. Webster .....	" .....	" .....	.....
W. D. Davis	Davis House.....	"	40
J. W. Emery	"	"	15
F. T. Huntington	Maplewood	"	6
Frank E. Colby	Oak Cottage.....	"	8
C. C. French .....	" .....	" .....	.....
George A. Gordon .....	" .....	" .....	.....
C. H. Courser .....	" .....	" .....	.....
A. J. Parker	Parker	"	10
Wesley Felch .....	" .....	" .....	.....
J. G. Rice	"	"	12
George H. Savage.....	" .....	" .....	.....
HILL.			
V. S. Straw	Glendale.....	Hill	30
L. T. Dearborn	"	"	10
H. L. Brown	"	"	12
D. B. Dickerson	"	Danbury	10
F. W. Foster	Riverside Farm.....	"	8
C. M. Cilley	"	Hill .....	.....
J. E. Newton .....	" .....	" .....	.....
George H. Cilley	Long Hill Farm.....	"	12
C. A. Blake .....	" .....	" .....	.....
W. H. Morrill .....	" .....	" .....	.....
HILLSBOROUGH.			
Peter H. Rumrill	St. Peter.....	Hillsboro' Bridge	25
William E. Gay	Maplewood Farm.....	"	20
William Whittle	Maplewood	"	10
Danforth & Gunnnett.....	Hillside Cottage	Hillsboro' Centre	8
James M. Wilkins	Grove Cottage	"	10
J. B. Whittemore	Valley Hotel.....	Hillsboro' Bridge	75
E. C. Hoyt & Sons.....	Lake View	Hillsboro' Centre	100
W. E. Proctor	Proctor House.....	Hillsboro' Bridge .....	.....
Susan Gay	Elm Cottage.....	Hillsboro' Centre	10
Frank D. Gay	Echo Cottage.....	"	20
HINSDALE.			
Ferren & Holland	Ashuelot	Hinsdale.....	50
I. K. Barcom	Bellevue .....	" .....	.....
Mrs. Janett Larcom	Hillside Farm	"	16
Waldo Rowillard	Mountain-Side Farm	"	25
Wallace Holton	Terrace Hall.....	" .....	.....



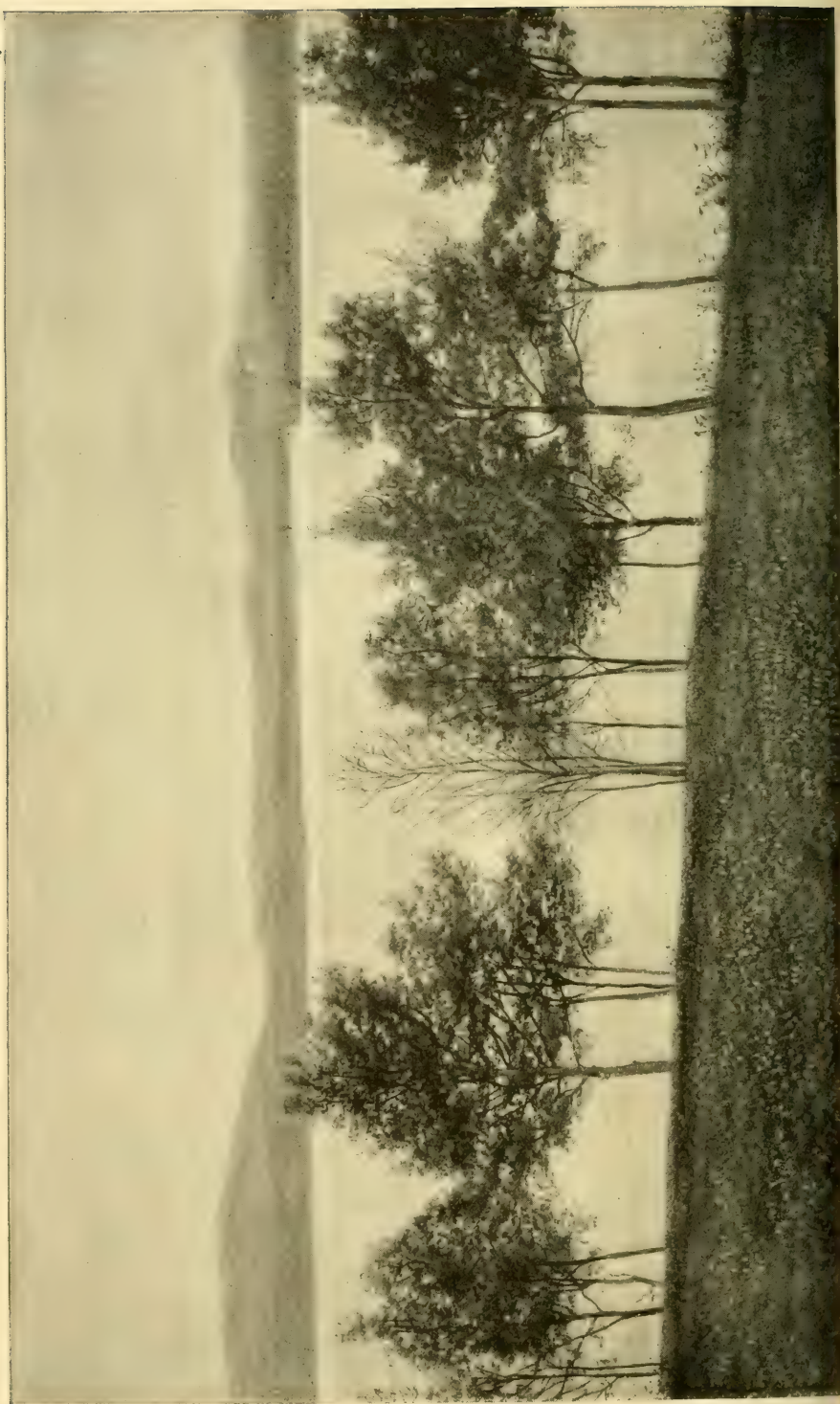
SILVER LAKE. — MADISON.

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
HOLDERNESS.			
Leon H. Cilley.....	Asquam.....	Holderness.....	130
Isaac Smith.....	Squam Mountain.....	".....	30
C. L. True.....	Lake Farm.....	".....	30
E. B. Balch.....	Camp Chocorua.....	".....	.....
Winthrop Talbot.....	Camp Asquam.....	".....	.....
R. B. Willoughby.....	Willoughby.....	".....	.....
B. F. Jewell.....	Mount Livermore.....	".....	100
H. S. Buzzell.....	White Oak.....	".....	15
R. B. Piper.....	Innisville.....	".....	.....
Newman Crowell.....	Cedar Cottage.....	".....	14
Robert Curry.....	Lakeside Cottage.....	".....	10
E. C. Bennett.....	Mount Morgan.....	".....	35
Jason Sanborn.....	.....	Plymouth.....	20
B. T. Mills.....	Seven Pines.....	".....	50
S. J. Sleeper.....	Asquam View.....	Holderness.....	12
HOLLIS.			
S. M. Spaulding.....	.....	Hollis.....	.....
Mrs. Warner Read.....	.....	".....	.....
William P. Cutter.....	.....	".....	.....
Maria Austin.....	.....	".....	.....
Edward P. Brooks.....	.....	".....	15
Levi Abbot.....	.....	".....	.....
John Stark.....	.....	".....	.....
Mrs. Mary A. Lovejoy.....	Silver Lake House.....	".....	.....
Mrs. A. A. Paull.....	.....	".....	.....
Mrs. A. P. Gale.....	.....	".....	.....
HOKSETT.			
Horace Bonney.....	Ayer House.....	Hooksett.....	.....
Horace H. Parker.....	.....	".....	.....
Mrs. Hannah Farmer.....	.....	".....	.....
Henry C. Carbee.....	.....	".....	.....
John I. Otterson.....	Otterson House.....	".....	14
Rufus Fuller.....	.....	".....	.....
HOPKINTON.			
Frank A. Hale.....	Perkins Inn.....	Hopkinton.....	100
H. Sumner Chase.....	Highland Farm.....	Contoocook.....	50
W. L. Moulton.....	Pleasant View Farm.....	East Weare.....	20
George Symonds.....	.....	Hopkinton.....	15
Reuben A. Gerry.....	Gerry House.....	Contoocook.....	20
William F. Dodge.....	Sargent House.....	Hopkinton.....	16
Guy Montgomery.....	.....	".....	.....
Lucy A. White.....	.....	".....	.....
HUDSON.			
S. A. Greeley.....	.....	Hudson.....	.....
Mrs. Peter Poff.....	.....	".....	.....
Clifton M. Hills.....	.....	".....	.....
JACKSON.			
M. C. Wentworth.....	Wentworth Hall.....	Jackson.....	150
Trickey Brothers.....	Jackson Falls.....	".....	40
W. A. Meserve.....	Iron Mountain.....	".....	100
C. W. Gray.....	Gray's Inn.....	".....	125
S. M. Thompson.....	Glen Ellis.....	".....	125
C. E. Gale.....	Eagle Mountain.....	".....	90
J. E. Meserve.....	Hawthorne.....	".....	40
Frank Wilson.....	Wilson Cottage.....	".....	35
I. H. Harriman.....	Spruce Cottage.....	".....	12
J. M. Perkins.....	Carter's Notch.....	".....	28
W. G. Gray.....	Gray's Inn.....	".....	.....

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
JACKSON. — <i>Continued.</i>			
B. M. Fernald	Glendon Cottage	Jackson	22
C. B. Perkins	Perkins Cottage	"	14
W. E. Elkins	Cliff Cottage	"	11
C. S. Meserve	Mapleton Cottage	"	18
Ephraim Garland	Dundee Cottage	Lower Bartlett	
JAFFREY.			
J. B. Proctor	Proctor House	Jaffrey	25
Jonas Cutter	Cutter House	"	70
M. E. Cutter	Central House	"	
Benjamin Pierce	Granite State House	East Jaffrey	
J. H. Poole	The Ark	Jaffrey	40
E. P. & E. C. Shattuck ..	Shattuck House	"	50
Mrs. A. D. Pierce	"	"	20
F. J. Lawrence	"	"	12
Alfred Sawyer & Son	Maple Retreat	East Jaffrey	15
JEFFERSON.			
Plumer & Porter	Waumbek	Jefferson	250
E. E. Bedell	Jefferson Hill House	"	100
P. C. Plaisted	Plaisted House	"	
John W. Crawshaw	Mount Adams	Jefferson Highlands ..	55
E. A. Crawford & Son ..	Crawford House	"	45
J. L. Pottle	Highland House	"	50
G. W. Crawford & Son ..	Pliny Range	"	45
T. M. Bradley	Grand View	Jefferson	40
Frank W. Collins	Maple House	"	
Plumer & Porter	Star King	"	
W. H. Crawford	Cold Spring	"	30
Hight Brothers	Union House	"	30
N. M. Davenport	Hillside House	"	23
John Palmer	Cloverdale	"	
Mrs. C. A. Woodward	Woodward Cottage	"	
KENSINGTON.			
Mrs. J. P. Lamprey	Pine Grove	Kensington	12
Mrs. S. C. Chase	"	"	10
W. N. Shaw	Orchard Hill	Exeter	6
Mrs. D. D. Prescott	"	"	
Clinton Gove	"	"	
KINGSTON.			
G. A. Varrell	Kingston House	Kingston	20
Mrs. S. N. Gray	Great Hill Cottage	Exeter	12
Mrs. E. M. Frost	Frost House	Kingston	
Henry Goodwin	"	"	10
O. H. Key	"	"	
John T. Hilliard	"	"	
Samuel W. Stevens	"	Exeter	6
E. Benson Bartlett	"	"	15
John A. Furber	"	"	
Charles Elkins	Birch Grove Farm	"	10
Mrs. F. M. Cummings ..	Maplewood Farm	"	20
LACONIA.			
G. W. Weeks	Lakeside House	The Weirs	150
C. E. Sleeper	Sanborn's House	"	100
J. W. Williams	Winnecoette	"	75
Dennett & Brown	Aquedoktan	"	40
Mrs. S. C. Moore	Endicott House	"	30
D. B. Story	Story's Hotel	"	50
Mrs. G. H. Mitchell	Eagle Cottage	"	20
John Spalding	Good Luck House	"	20

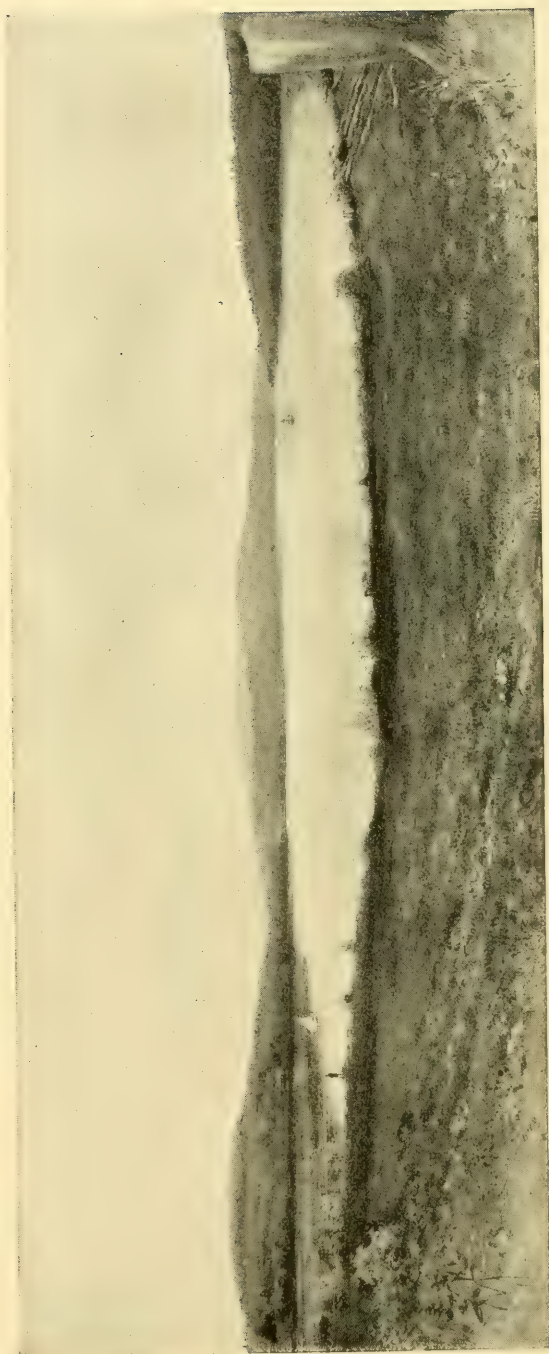


SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
LACONIA.—Continued.			
Mrs. E. L. True.....	Maple Cottage.....	The Weirs.....	25
Mrs. L. W. Lovett.....	Lovett Cottage.....	" ".....	15
Mrs. Moses Gordon.....	" ".....	" ".....	15
Mrs. J. E. Avery.....	" ".....	" ".....	20
Fred B. Smith.....	Eagle Hotel.....	Laconia.....	50
L. H. French.....	Wonolancet Hotel.....	" ".....	60
M. H. Fernald.....	Kirtland House.....	" ".....	40
Mrs. A. A. Weeks.....	Vue de l'eau.....	" ".....	100
E. A. Chase.....	Round Bay Farm.....	" ".....	16
Seth Flanders.....	Round Bay Farm.....	" ".....	10
LANCASTER.			
Ned Linsley & Son.....	Lancaster House.....	Lancaster.....	100
W. L. Rowell.....	Hillside Cottage.....	" ".....	
Chester A. Ball.....	Williams House.....	" ".....	
LANDAFF.			
J. E. Hall.....	" ".....	Landaff.....	
O. D. Eastman.....	" ".....	" ".....	15
J. F. Gale.....	" ".....	" ".....	
Mrs. C. C. Temple.....	" ".....	Lisbon.....	
LANGDON.			
George R. Holden.....	Elm Farm.....	Langdon.....	12
Henry M. Elwell.....	" ".....	" ".....	
LEBANON.			
Sidney Roberts.....	Chiron Spring.....	Lebanon.....	40
Osgood T. Purmont.....	Sunside House.....	" ".....	
LEE.			
Howard M. Glidden.....	" ".....	Lee.....	20
Mrs. Robert Dalton.....	" ".....	" ".....	10
Charles Allen.....	" ".....	" ".....	
LEMPSTER.			
A. R. Hood.....	Granite House.....	Lempster.....	18
Fred Barton.....	Lempster House.....	" ".....	35
LINCOLN.			
Elliott Brothers.....	Flume House.....	Lincoln.....	
LISBON.			
E. H. Goodnow & J. W. Prackett, Jr.....	Goodnow House.....	Franconia.....	225
Bowles & Hoskins.....	Sunset Hill House.....	Sugar Hill.....	300
H. Noyes & Son.....	Lookoff Hotel.....	" ".....	200
W. B. Phillips.....	Phillips House.....	Franconia.....	75
Wells & Woolson.....	Breezy Hill House.....	Lisbon.....	160
Lyman Aldrich.....	Maple Cottage.....	Sugar Hill.....	25
George Aldrich.....	Grand View.....	" ".....	
Nathan Whipple.....	Cedar Cottage.....	" ".....	
Leonard Smith.....	Hillside Farm.....	" ".....	20
Jason Comey.....	Echo Farm.....	Franconia.....	20
Edwin Knight.....	Hillside House.....	Lisbon.....	30
E. W. Bartlett.....	Elm House.....	" ".....	25
Will Bishop.....	Bishop Farm.....	" ".....	25
Ira Jesseman.....	Jesseman Farm.....	" ".....	15
Foster Aldrich.....	Pearl Lake.....	" ".....	25
Simon Bowles.....	Elm Farm.....	Sugar Hill.....	25
S. H. Brigham.....	Brigham House.....	Lisbon.....	50
Moses Northey.....	Northey House.....	" ".....	20
Olivia Young.....	Sugar Hill.....	Sugar Hill.....	
Darius Jesseman.....	Jesseman Farm.....	" ".....	30

SUMMER HOTELS AND BOARDING-HOUSES. — *Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
LITCHFIELD.			
Charles H. McQuestion..	Island Farm.....	Reed's Ferry .....	.....
Thomas McQuestion.....	Highland Spring.....	Litchfield .....	.....
Robert McQuestion	Good Samaritan	Hudson .....	.....
Jacob Whittemore.....	Lilac Cottage.....	Litchfield .....	.....
LITTLETON.			
Farr & Jarvis	Oak Hill House	Littleton	150
A. W. Weeks	Cheswick Inn	"	100
E. O. & Gilman Wheeler	Wheeler Hill House.....	"	35
Aaron D. Fisher.....	Sunnyside	"	14
E. D. Sawyer	Mountain House.....	"	50
M. F. Young & Co.	The Maples	"	50
F. R. Glover.....	Elni Cottage	"	20
Noah Farr	Meadow Farm	"	16
William Harriman	Hill Cottage	"	15
George Abbott	"	"	12
LONDONDERRY.			
William G. Cross	Woodbine Cottage.....	Londonderry	10
Charles S. Pillsbury	"	"	8
John H. Burbank	"	"	20
B. F. Whorf	Highland View	"	10
C. B. Knowles.....	"	"	20
S. P. Robie	Lake View.....	"	12
John A. Moore .....	" .....	" .....	.....
G. F. McGregor .....	" .....	" .....	.....
R. Flanders	"	"	10
Thomas T. Moore	Locust Grove Farm.....	Derry Depot.....	12
LOUDON.			
J. J. A. Hutchins.....	"	Loudon .....	.....
H. J. Osgood	"	"	12
Mrs. J. L. Perkins.....	Perkins House	"	16
John B. Perkins.....	"	"	20
David S. Clough	"	"	20
Mrs. D. W. Whittemore ..	Hillside House .....	" .....	.....
Josiah Leavitt	Sunset Lodge, Corn Hill.	"	25
H. Alvin Beck	Wild View	"	20
Doddridge Wheeler .....	" .....	" .....	.....
Amos Currier	Forest Home	"	15
D. P. Wheeler.....	Hillside Farm	"	20
Davis S. Clough.....	" .....	" .....	.....
A. H. Clough	"	"	15
John M. Ladd	"	"	20
Charles E. Sanborn .....	" .....	" .....	.....
J. A. Clough.....	" .....	" .....	.....
Levi Pearl .....	" .....	" .....	.....
Amos Peaslee .....	" .....	" .....	.....
J. L. Buswell	"	"	20
J. P. Wheeler .....	" .....	" .....	.....
W. H. Sanborn	"	"	25
A. M. Osgood .....	" .....	" .....	.....
John R. Osbourne.....	Prospect House	"	15
LYMAN.			
Miner & De Huff	Highland Home.....	Lyman	10
H. & W. L. Chase	"	"	15
LYME.			
Kate G. Perkins.....	Union House	Lyme	10
George R. Amsden.....	" .....	" .....	.....
H. Chase	"	"	15
J. W. Minkler.....	Minkler Hotel.....	"	50



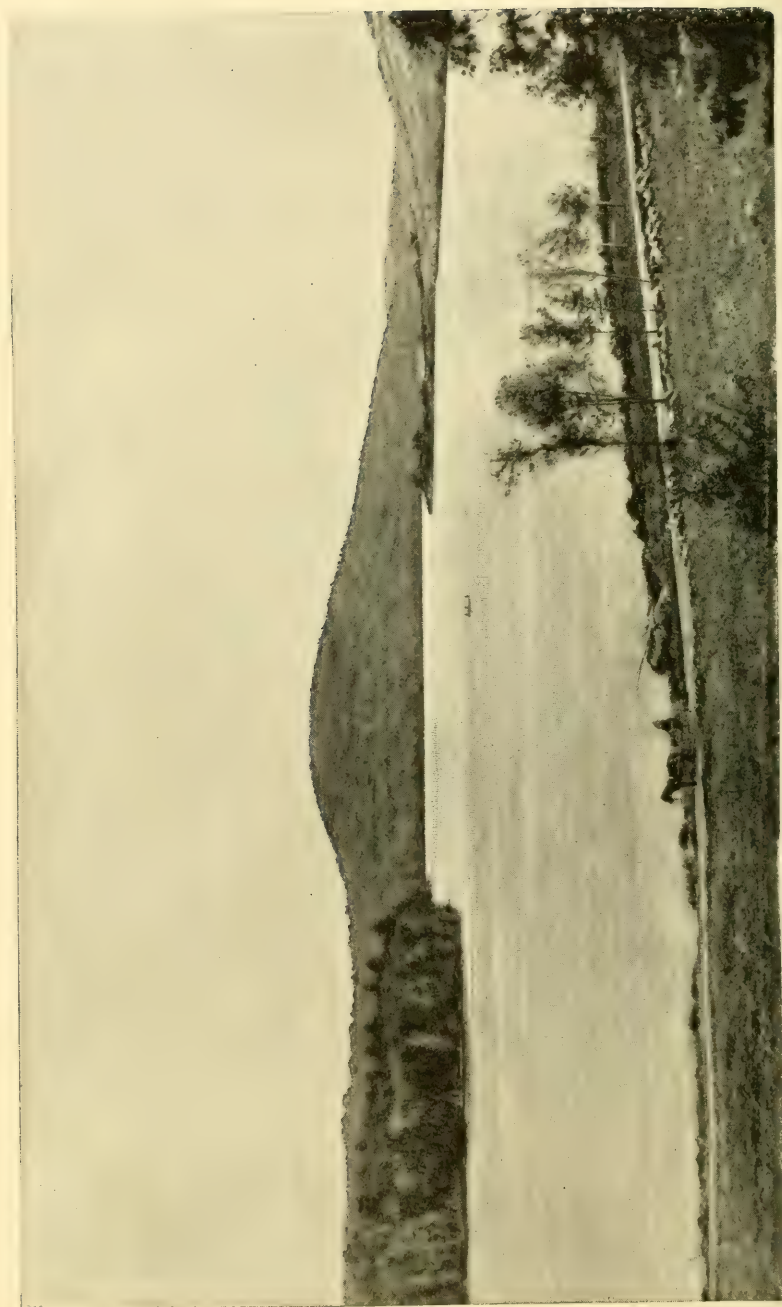
GRANITE LAKE. — NELSON.

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
LYME.—<i>Continued.</i>			
H. F. Carr		Lyme	6
H. H. Holt		"	6
LYNDEBOROUGH.			
Levi P. Hadley	Pine Grove	Lyndeborough	
E. P. Dunklee	Mountain Side	"	80
Dana B. Sargent	"	"	20
D. P. Hartshorn	Hillside Home	"	20
J. A. Woodward	"	"	15
Rodney Perham	"	East Wilton	
Mrs. Olive Watkins	Poplar House	North Lyndeborough	30
H. H. Joslin	"	"	
Mrs. F. H. Curtis	"	East Wilton	13
Mrs. Mary Swazey	"	South Lyndeborough	
Charles Butler	"	"	
MADISON.			
David Knowles	Lake View	Silver Lake	33
H. C. Colby	Jackson House	Madison	30
Mrs. Arvilla R. Forrest	Silver Lake House	Silver Lake	25
Robert H. Chick	Maple House	Madison	30
Nathaniel Churchill	Churchill House	"	16
MARLOW.			
George A. Petts	Forest House	Marlow	
MEREDITH.			
O. N. Roberts	Grove House	Meredith	
H. W. Lincoln	Prospect House	"	50
T. Gray	Elm House	"	40
W. H. Keysor	Mountain View	"	30
P. & E. A. Page	Bay View	"	20
D. L. Alexander	Maplewood House	"	12
M. C. Pease	Highland House	"	
A. J. Watson	Lake House	"	20
W. E. S. Foss	Waukawan	"	40
T. Ham	"	"	
J. Mudgett	"	"	10
W. B. Smith	"	North Sanbornton	20
N. B. Plumer	Granite Ledge Cottage	Meredith Centre	8
Alvah Smith	"	"	10
W. W. Ballard	"	"	25
MERRIMACK.			
George F. Spalding	"	Merrimack	30
Frank Deering	Reeds Ferry House	Reeds Ferry	35
Mrs. D. S. Beard	Althea Cottage	"	10
Mrs. Wingate M'Question	"	Merrimack	
E. F. Giddings	"	Thornton's Ferry	
MIDDLETON.			
Albert S. Baker	Hillside Farm	Wakefield	12
MILFORD.			
J. H. Plummer	Ponemah	Amherst Station	100
H. D. Epps	Endicott	Milford	30
E. P. Hutchinson	Broad View	Wilton	15
E. R. Cutts	"	Milford	
John Horton	Elm Farm	"	10
MILTON.			
Harriet Edgerly	Phenix	Milton	20
Horace Drew	Drew Hotel	"	80

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
MILTON. — <i>Continued.</i>			
Crosby H. Prescott.....	Hotel Prescott.....	Milton.....	.....
John E. Hayes.....	.....	".....	.....
Mrs. Abbie D. Butler.....	.....	".....	15
Samuel W. Wallingford.....	.....	".....	.....
Benjamin Hoyle.....	Centennial House.....	.....	.....
Daniel Philbrick.....	.....	Milton Mills.....	.....
John W. Hanson.....	.....	".....	.....
MONT VERNON.			
G. E. Baker.....	Bellevue.....	Mont Vernon.....	60
M. J. Sherman.....	Mont Vernon Hotel.....	".....	250
Clark Campbell.....	Prospect House.....	".....	50
W. H. Conant.....	Conant Hall.....	".....	50
Miss Hattie Dean.....	Deanery.....	".....	30
Ira Hill.....	Hillsborough House.....	".....	40
W. S. A. Starrett.....	Home Cottage.....	".....	40
W. H. Marvell.....	Village Farm.....	".....	15
Mrs. J. A. Holt.....	.....	".....	10
Mrs. S. C. Clement.....	.....	".....	10
Henry T. Dodge.....	Sunnyside Farm.....	".....	15
Charles F. Stinson.....	Highland Farm.....	".....	25
Thomas Sargent.....	Cesar Brook Farm.....	".....	16
Daniel H. Smith.....	Pine Grove Farm.....	".....	25
MOULTONBOROUGH.			
George K. Brown.....	Long Island Hotel.....	Long Island.....	40
A. M. Blake.....	Island Home.....	".....	50
J. C. Pitman.....	Elmwood.....	Moultonborough.....	15
Roland H. Green.....	Cambridge.....	".....	.....
Mrs. Frank Green.....	Red Hill.....	".....	.....
J. W. Day.....	Lake View.....	Lake View.....	15
James M. Smith.....	Moultonborough.....	Moultonborough.....	25
A. P. Jaclard.....	Union.....	".....	25
Mrs. B. McDonald.....	Spring Home.....	".....	20
Eben Moulton.....	.....	".....	.....
Mrs. Jennie Graves.....	.....	Centre Harbor.....	.....
Charles Greene.....	.....	".....	.....
Jim Moulton.....	.....	".....	.....
Alvin Moulton.....	.....	".....	.....
Mrs. George Gilman.....	Sunset Cottage.....	Melvin Village.....	16
Mrs. C. A. Moulton.....	.....	Moultonborough.....	.....
Aaron Langdon.....	.....	".....	.....
Albert S. Freese.....	.....	".....	.....
Mrs. John Beane.....	.....	Centre Harbor.....	.....
Daniel Goodwin.....	Basin Hill Farm.....	".....	15
NELSON.			
Orson Tolman.....	Eagle Lake Cottage.....	Nelson.....	12
Frank Hardy.....	.....	".....	.....
John Lane.....	.....	".....	.....
Frank P. Nelson.....	.....	Munsonville.....	.....
Sidney A. Greene.....	.....	".....	.....
Mrs. Mark M. Bailey.....	Brookside.....	Nelson.....	10
Mrs. Calvin Fletcher.....	.....	".....	10
NEW BOSTON.			
S. L. Marden.....	Summit House.....	New Boston.....	75
Mrs. George Greenwood.....	Greenwood House.....	".....	25
C. A. Trow.....	Young's House.....	".....	.....
Mrs. S. D. Atwood.....	Prospect Cottage.....	".....	20
Richard Patten.....	Highland Farm.....	".....	30
James Warren.....	Maple Ridge.....	".....	22
Almus Warren.....	Wilson Hill.....	".....	55



WINNEPOCKET LAKE, — WEBSTER.

SUMMER HOTELS AND BOARDING-HOUSES. — *Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
NEW BOSTON. — <i>Cont'd.</i>			
John Kidder.....	.....	New Boston.....	25
Mrs. S. T. Scofield.....	.....	" ".....	12
C. F. Dodge.....	.....	" ".....	30
George A. Prince.....	Hillside Farm.....	" ".....	20
G. A. Hill.....	.....	" ".....	20
Mrs. Frank Read.....	Pleasant View Farm.....	" ".....	20
NEW CASTLE.			
Frank Jones.....	Wentworth.....	Portsmouth.....	500
Miss Louise White.....	.....	Newcastle.....	14
Thomas Rand.....	Rand's Cottage.....	" ".....	15
C. E. Campbell.....	.....	" ".....	.....
Mrs. Sarah Emerson.....	.....	" ".....	.....
Mrs. Addie Frost.....	.....	" ".....	.....
Thomas Haywood.....	.....	" ".....	.....
John Albe.....	.....	" ".....	.....
George A. Bartlett.....	.....	Cambridge, Mass.....	.....
Miss Esther Albe.....	.....	Newcastle.....	.....
Mrs. Adeline Yeaton.....	Cambridge Cottage.....	.....	.....
Warren A. Osgood.....	Fort Cottage.....	Suncook.....	.....
Elias Tarlton.....	.....	Newcastle.....	.....
NEWBURY.			
George W. Blodgett.....	Forest House.....	Newbury.....	200
Mrs. S. J. Clement.....	Lake.....	" ".....	30
N. S. Johnson.....	Mountain House.....	Mt. Sunapee.....	.....
Mrs. Davis Shaw.....	Mountain View.....	South Newbury.....	12
Mrs. B. A. Dodge.....	.....	Mt. Sunapee.....	.....
Mrs. Cereido Gillingham.....	Twilight House.....	Newbury.....	.....
Mrs. Harry C. Morse.....	Maple Grove Farm.....	South Newbury.....	20
N. B. Bly.....	Fair Haven Farm.....	" ".....	10
Jonathan Rowe.....	.....	Newbury.....	.....
NEW DURHAM.			
Charles Brooks.....	.....	New Durham.....	20
Joseph P. Brooks.....	.....	" ".....	10
NEW IPSWICH.			
H. A. Coleman.....	Appleton Arms.....	New Ipswich.....	50
C. L. Robbins.....	.....	" ".....	.....
Fannie Barr.....	.....	" ".....	.....
J. Silver, Jr.....	Clark's Hotel.....	" ".....	.....
George Porter.....	.....	" ".....	.....
A. J. Jorden.....	Cold Spring Farm.....	" ".....	10
NEWINGTON.			
Mrs. J. W. Whidden.....	.....	Newington.....	.....
Moses H. Whitman.....	.....	" ".....	.....
C. M. DeRochemont.....	.....	" ".....	.....
James W. Coleman.....	.....	" ".....	.....
Frederick Pickering.....	.....	" ".....	.....
NEWMARKET.			
Joseph B. Silver.....	Washington House.....	Newmarket.....	30
John Smith.....	Elm House.....	Newmarket Junction.....	.....
Nelly Morgan.....	Newmarket Hotel.....	Newmarket.....	20
Edward H. Clark.....	.....	" ".....	.....
Mrs. Jasper H. Burley.....	.....	" ".....	.....
Almon P. Smith.....	Garrison Cottage.....	" ".....	14
Smith Sanborn.....	.....	" ".....	8
O. J. Drew.....	Bay View Farm.....	" ".....	8

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
NEW LONDON.			
Burpee & Whipple.....	The Heildelburg.....	New London.....	125
H. J. Currier.....	The Elms.....	" ".....	25
D. S. Seannans.....	Seannans' House.....	" ".....	20
N. C. Todd.....	Maple Hill House.....	" ".....	25
J. C. Cross.....	Little Sunapee.....	" ".....	16
Baxter Gay.....	Glengae House.....	" ".....	50
G. M. Knight.....	Sunapee View.....	" ".....	40
G. P. Sholes.....	Mountain View.....	" ".....	20
E. F. Messer.....	Pleasant View.....	" ".....	20
A. J. Messer.....	Highland Home.....	" ".....	30
Hiram Sargent.....	Pleasant Lake Farm.....	" ".....	12
W. P. Messer.....	Lakeside Farm.....	" ".....	16
F. A. Messer.....	Maple Grove House.....	" ".....	16
Al Worthen.....	Burpee Hill House.....	" ".....	10
G. S. Prescott.....	Lake Side.....	" ".....	50
B. C. Davis.....	Willows.....	" ".....	.....
J. K. Law.....	Willow Farm.....	" ".....	12
Natt Messer.....	Quiet Home.....	" ".....	10
Mrs. L. H. Fowler.....	Pine Tree Inn.....	" ".....	.....
Mrs. E. G. Smith.....	Elm Farm.....	" ".....	.....
David Hayes.....	Currier Home.....	" ".....	.....
E. P. Burpee.....	.....	" ".....	.....
C. E. Shepard.....	.....	" ".....	.....
Stephen Messer.....	.....	" ".....	.....
Mrs. C. D. Sargent.....	.....	" ".....	16
R. Farwell.....	.....	" ".....	16
A. J. Sargent.....	.....	" ".....	.....
W. S. Carter.....	Carter House.....	" ".....	10
N. L. Sargent.....	Sargent Cottage.....	" ".....	5
J. B. Roby.....	.....	" ".....	.....
Mrs. R. O. Messer.....	.....	Scytheville.....	.....
Mrs. A. B. Whittier.....	Whittier House.....	" ".....	20
NEWPORT.			
E. L. Putney.....	Newport House.....	Newport.....	.....
Henry Barker.....	Phenix.....	" ".....	50
Samuel M. Rockwell.....	Pleasant View Farm.....	" ".....	8
George H. Fairbanks.....	.....	" ".....	.....
Richard Thompson.....	.....	" ".....	12
Benjamin F. Carr.....	.....	" ".....	.....
Calvin Brown.....	Riverside House.....	" ".....	50
Jonathan Daglish.....	.....	" ".....	.....
Mrs. Goodrich.....	.....	" ".....	.....
Solomon Moody.....	Maplewood Farm.....	" ".....	12
Ira Harmon.....	Highland Cottage.....	No. Newport.....	20
Edward Fletcher.....	.....	" ".....	12
Frederick W. Aiken.....	.....	Newport.....	.....
Charles E. Stubbs.....	.....	" ".....	.....
Sidney Stockwell.....	.....	" ".....	.....
Mrs. J. E. Reed.....	.....	" ".....	10
NEWTON.			
George W. Hoyt.....	Travelers' Home.....	Newton.....	47
Nathan Gould.....	Gould's Hill Farm.....	" ".....	19
NORTHFIELD.			
Mrs. Walter Glines.....	.....	Northfield.....	.....
C. W. Whicher.....	Maple Cottage.....	Tilton.....	20
Morrill Moore.....	.....	Northfield.....	15
NORTH HAMPTON.			
Albert Bachelder.....	Little Boar's Head.....	Little Boar's Head.....	150
G. A. Boynton.....	Boynton.....	" ".....	25

WALKER'S POND.—CONWAY.

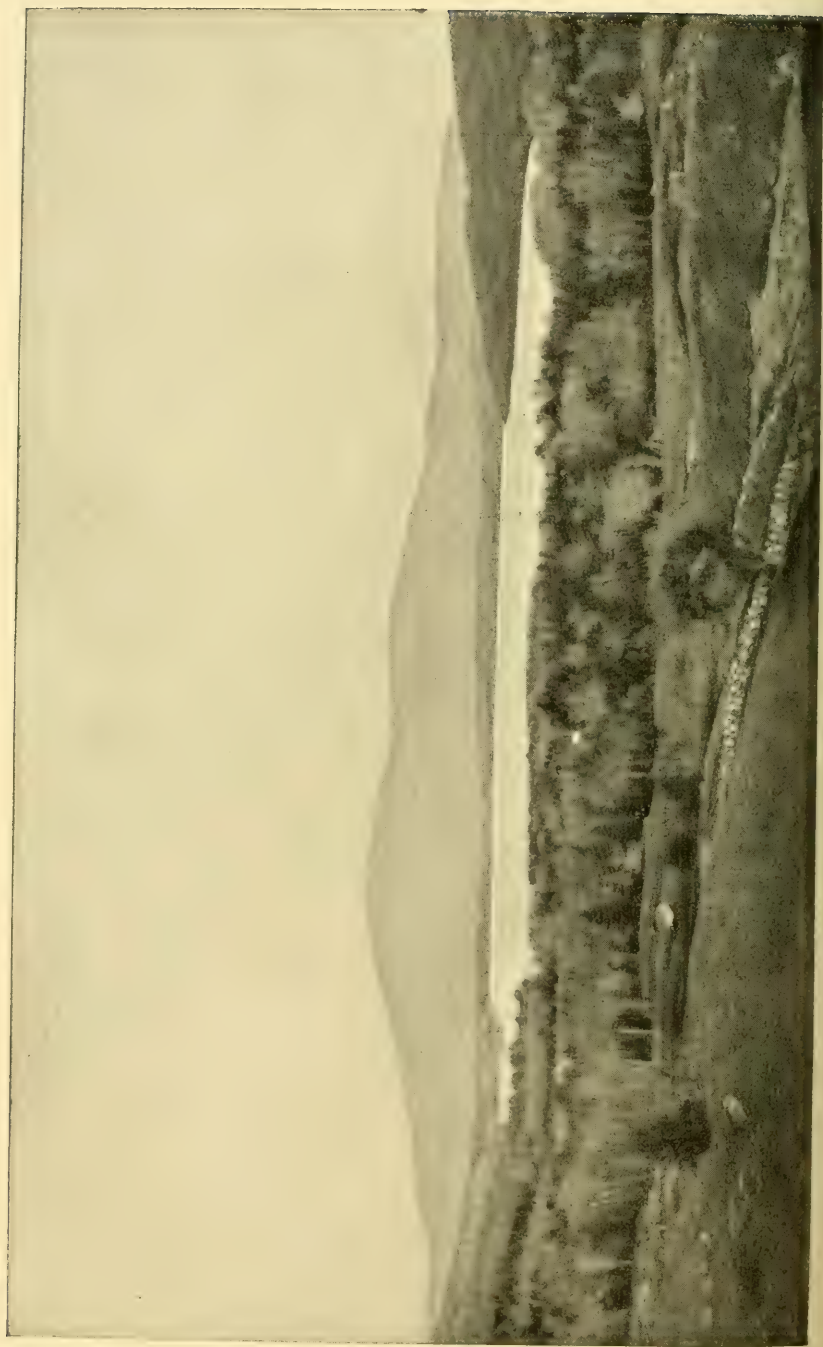


SUMMER HOTELS AND BOARDING-HOUSES. — *Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
NO. HAMPTON. — <i>Cont'd.</i>			
E. T. Brown.....	.....	Little Boar's Head.....	.....
C. Prochold.....	.....	North Hampton.....	.....
NORTHUMBERLAND.			
E. E. Tibbetts.....	Melcher House.....	Groveton.....	90
Merrian, Johnson & Co.	Eagle Hotel.....	".....	50
T. S. Clark.....	.....	".....	.....
John Ennes.....	.....	".....	.....
NORTHWOOD.			
Mrs. B. J. Demeritt.....	Demeritt House.....	Northwood.....	.....
Mrs. Sarah Caswell.....	Caswell House.....	Northwood Ridge.....	10
Mrs. S. S. Moore.....	Moore House.....	Northwood Centre.....	.....
S. W. Drake.....	Harvey.....	".....	.....
J. M. Perry.....	.....	Northwood.....	16
N. E. Cate.....	.....	Northwood Ridge.....	.....
H. H. Hilliard.....	.....	Northwood Narrows.....	.....
Francis J. Hanson.....	.....	Northwood.....	.....
Mrs. G. Smith.....	.....	".....	.....
Enoch P. Flagg.....	.....	".....	20
NOTTINGHAM.			
Charles O. Smith.....	.....	Northwood.....	12
Mary J. Demeritt.....	.....	Nottingham.....	.....
Ira T. Daniels.....	.....	North Nottingham.....	14
W. O. Hills.....	.....	Nottingham.....	.....
Joseph P. Harvey.....	.....	".....	.....
Samuel Durgin.....	.....	".....	.....
Frank H. Butler.....	.....	".....	.....
ORANGE.			
D. L. Bryant.....	Mountain House.....	Canaan.....	30
ORFORD.			
A. D. Chamberlin.....	Elm House.....	Orford.....	.....
W. R. Barnes.....	.....	".....	.....
Everett Gage.....	.....	".....	.....
OSSIPEE.			
E. P. Allen.....	Carroll House.....	Ossipee.....	.....
J. W. Chamberlain.....	Central House.....	".....	40
E. K. Knox.....	.....	West Ossipee.....	.....
James Carney.....	.....	Ossipee.....	.....
Daniel J. Sanders.....	.....	Leighton's Corner.....	.....
J. E. Hodgdon.....	Hackmetack.....	Ossipee.....	20
Alva Hazzlett.....	.....	".....	.....
PELHAM.			
Charles Brown.....	Stickney Farm.....	Pelham.....	20
W. W. Butler.....	Butler Farm.....	".....	20
Mrs. Claribel Butler.....	Gumpus Valley.....	".....	20
Angie G. Kent.....	Forest Cottage.....	".....	7
Orlando W. Spaulding.....	.....	".....	.....
PEMBROKE.			
John T. Merrill.....	Pembroke Cottage.....	Pembroke.....	18
David B. Richardson.....	.....	".....	.....
George P. Morgan.....	.....	".....	.....
Frank W. Stevens.....	.....	East Pembroke.....	.....
PETERBOROUGH.			
F. B. Tucker.....	Tucker House.....	Peterborough.....	.....
A. O. Smith.....	.....	".....	.....

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
PETERBORO', — <i>Cont'd.</i>			
C. W. Hunter.....	Silo Farm	Peterborough	8
Jerome B. Shedd.....	.....	" .....	10
J. O. Nay .....	.....	" .....	12
Mrs. Mary A. Farnum.....	.....	" .....	12
William Moore.....	.....	" .....	12
J. E. Ellsworth.....	.....	" .....	12
Walter Haywood.....	.....	" .....	12
Philip Turner.....	Rock Farm	"	12
John Lynch .....	.....	" .....	12
Mrs. William Burt.....	.....	" .....	10
Marshall Nay .....	.....	" .....	10
PLAISTOW.			
James M. Davis.....	.....	Plaistow	10
Isaac H. Pollard.....	.....	" .....	10
Samner Courser.....	.....	" .....	10
N. H. Wentworth.....	Kimball Farm	Atkinson Depot.....	10
PLYMOUTH.			
C. M. Morse.....	Pemigewasset.....	Plymouth	250
Kate Jones.....	.....	Piermont	250
J. K. Hasford.....	.....	" .....	250
PITTSBURG.			
Henry Fling.....	Lake House	Pittsburg	20
Thomas Chester.....	Camp Chester.....	"	20
Ed. Blais .....	.....	" .....	30
PITTSFIELD.			
Josiah S. James.....	Mountain View	Pittsburg	35
F. E. Sanborn.....	Grand View	"	10
D. O. True.....	Highland Farm.....	"	10
Mrs. S. P. Bunker.....	Park House	"	25
S. A. Brown	Maple Hill Farm.....	"	25
H. Porter Smith .....	.....	" .....	25
P. S. Elliott .....	.....	" .....	25
F. W. Blake .....	.....	" .....	10
RANDOLPH.			
R. I. Leighton	Randolph Hill.....	Gorham	75
L. M. Watson	Ravine House.....	"	60
Benjamin Kelsey.....	Kelsey House	"	18
George Wood.....	Riverville Farm	Randolph.....	10
G. C. Bradley.....	Bradley's Cottage.....	"	12
RAYMOND.			
George W. Shepard.....	Shepard House.....	Raymond.....	25
F. G. Bean.....	Eagle Hotel	"	25
P. B. Corson.....	Corson House.....	"	25
T. F. & Hiram McClure.....	McClure House	"	23
Frank R. Grant	Lamprey House.....	"	20
John Eaton.....	Walnut Hill House.....	"	25
Joseph Richardson.....	Richardson House	"	10
M. V. B. Gile	Giles Cottage.....	"	12
H. W. Batchelder.....	Batchelder House.....	"	25
R. G. L. Tilton.....	Tilton	"	15
W. M. Leighton.....	The Wayside Farm.....	"	15
Ryland J. Mack.....	Raymond Cottage.....	"	14
J. W. Harriman.....	.....	" .....	14
RICHMOND.			
O. O. Whipple.....	.....	Richmond	10
L. A. Ballou	Red-top Farm	"	10



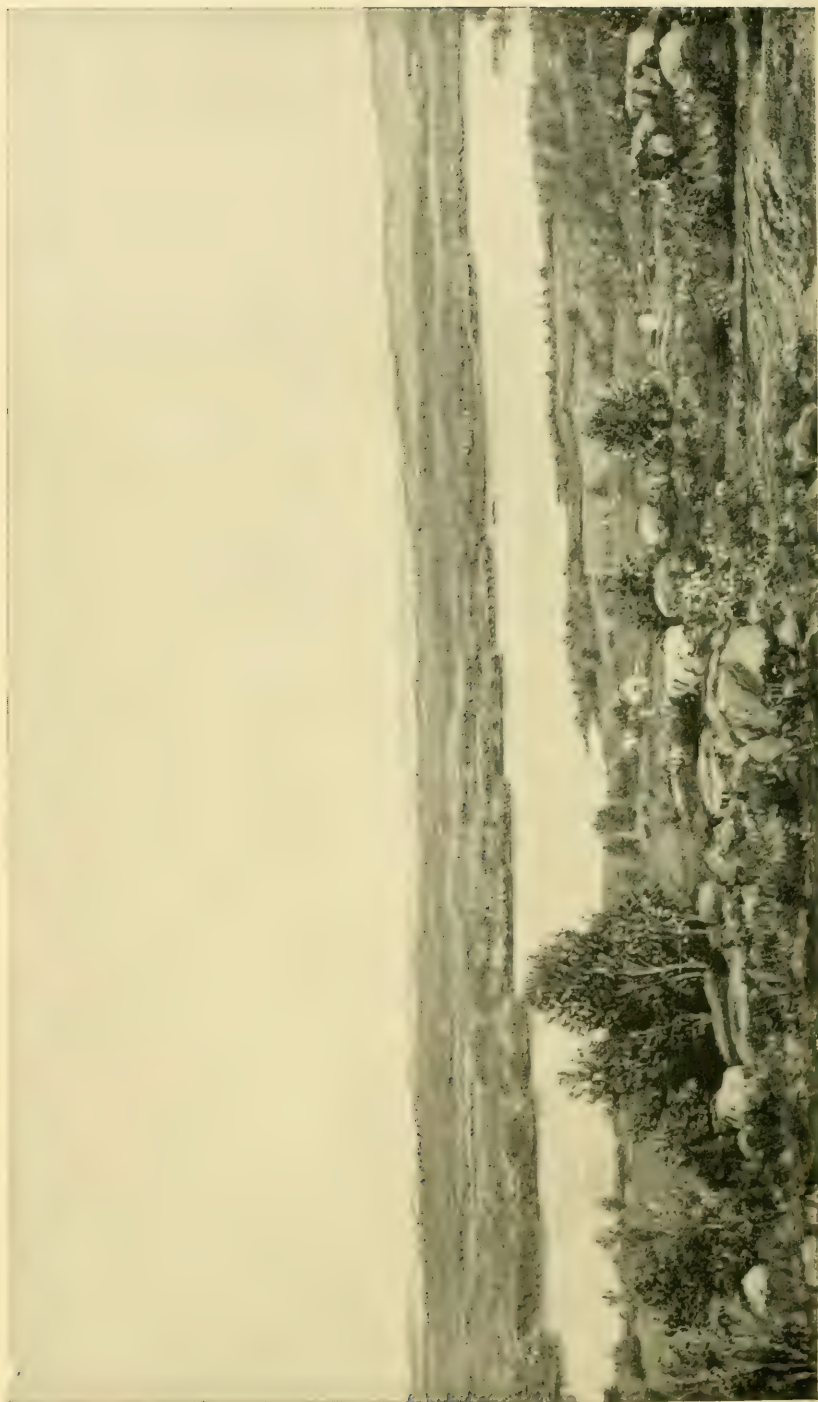
LAKE PLEASANT. — NEW LONDON

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
RICHMOND.—<i>Cont'd.</i>			
Leason Martin		North Richmond	
RINDGE.			
Frank N. Wheeler	Rindge Hotel	Rindge	
John E. Wood		East Rindge	
W. E. Stearns	Todd Hill House	Rindge	20
Mrs. L. L. Lawrence		"	12
D. H. Sargent		"	20
Frank D. Converse		West Rindge	
Hermion F. Prescott		"	
Miss Susie Parsons		Rindge	
Gibnan P. Wellington		"	
Henry W. Wellington		"	
C. E. Robinson		East Rindge	
Chester O. Hale		Rindge	30
ROLLINSFORD.			
Lewis Carey	Salmon Falls House	Rollinsford	
RUMNEY.			
Charles Spalding	Welcome House	Rumney Depot	20
H. C. Lufkin	Valley Farm House	West Plymouth	16
R. B. Clark	Daisy Cottage	Quincy	16
C. E. Bunker	Central House	Rumney	30
S. Adams & Son	Elm Avenue House	West Rumney	30
T. G. Stevens		Rumney	
C. C. Smart		Rumney Depot	
RYE.			
Henry Knox	Ocean Wave House	Rye Centre	150
J. C. Philbrick & Son	Farragut & Atlantic	Rye Beach	300
G. G. Lougee	Sea View	"	200
E. P. Philbrick	Rising Sun Cottage	"	50
S. B. Spear	Woodbine	"	25
D. W. Dalton	Centennial House	"	
A. J. Drake	Drake Cottage	"	
J. W. F. Hobbs	Hobbs Cottage	"	15
C. O. Philbrick	Elm Cottage	"	
W. S. Philbrick	Urada	"	
Mrs. E. C. Huse	Straw Cottage	Rye	70
T. I. Marden	Marden House	Rye Beach	50
Horace Sawyer	Sawyer House	"	65
R. L. Locke		"	
C. A. Jenness	Elmwood House	"	35
David Jenness		"	
N. G. Jenness		"	25
Sheridan Jenness		"	
O. S. Jenness	Jenness House	"	26
Amos P. Brown	Brown's Cottage	Rye	20
George W. Brown		"	
Horace F. Rand		Portsmouth	
S. W. Foss		"	
SALEM.			
George Woodbury	Woodbury House	Salem	12
Isaac Campbell	Walnut Hill Farm	North Salem	38
Charles Webster		Salem	5
George A. Lincoln		North Salem	
SALISBURY.			
Dr. J. J. Dearborn	Summer House	Salisbury	20
M. A. Sawyer		"	
J. C. Smith		"	

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
SALISBURY.—<i>Continued.</i>			
D. C. Stevens	Maple Grove	Salisbury	30
E. C. Currier	Maple Grove	West Salisbury	8
C. Greene	Maple Grove	Salisbury	
Mrs. John Corson	Maple Grove	Salisbury	
F. P. Drew	Elm House	Salisbury Centre	12
Nicholas Wallace	Elm House	Salisbury	
F. W. Prince	Riverside Farm	West Salisbury	18
A. L. Chapman	Kearsarge Cottage	Salisbury	
D. J. Mann	Kearsarge Cottage	Salisbury Centre	
J. T. Stevens	Kearsarge Cottage	West Salisbury	
SANBORNTON.			
Charles O. Johnson	Lake Cottage	Laconia	30
Nathaniel Davis	Lake Cottage	Laconia	
M. W. Bennett	Maplewood Farm	East Tilton	25
Hiram B. Philbrick	Maplewood Farm	East Tilton	
A. M. Osgood	Highland Farm	Franklin Falls	16
J. B. Calef	Highland Farm	Sanbornton	
N. G. Yeaton	Mountain View	Tilton	12
Isaac B. Hoyt	Mountain View	North Sanbornton	
SANDWICH.			
Henry F. Dorr	Sandwich House	Centre Sandwich	30
J. C. Burleigh	Pleasant House	" "	12
A. S. A. Gilman	Pleasant House	" "	10
H. E. Moulton	Pleasant House	" "	10
D. W. George	Pleasant House	" "	
Asahel Wallace	Bear Camp	" "	16
Samuel Chase	Bear Camp	" "	12
John A. Marston	Bear Camp	" "	20
S. D. Wiggin	Bear Camp	" "	16
L. C. Ambrose	Mount Whiteface House	North Sandwich	20
William McCrillis	Glen Cottage	North Sandwich	20
Frank Bryer	Mount Israel House	Centre Sandwich	18
Jonathan Tappan	Mount Israel House	Centre Sandwich	30
Eleanor Gilman	Mount Israel House	" "	10
S. H. Burleigh	Willow Cottage	" "	20
Ruth Claffey	Willow Cottage	" "	15
H. H. Powers	Lears Heights Cottage	" "	20
James E. Mudgett	Lears Heights Cottage	" "	15
James B. Goodwin	Lears Heights Cottage	" "	
SANDOWN.			
Enoch R. Quimby	Triple Elm	Sandown	15
John S. Colby	Elm View	"	24
Edwin C. Mills	Penne Royal	"	40
Charles A. Darbe	Darbe House	"	22
Allen Senter	Darbe House	"	20
David Tilton	Tilton House	"	20
SEABROOK.			
Lydia Parker	Parker House	Seabrook	
SHELBURNE.			
C. C. Hibbard	Winthrop House	Shelburne	40
S. J. Morse	Spring House	"	75
A. C. Evans	Evans Cottage	"	
A. E. Whitman	Maple Grove Cottage	"	10
S. A. Gates	Gates Cottage	"	35
A. E. Philbrick	Philbrick Farm	"	25
C. E. Philbrook	Grove Cottage	Gorham	



WEBSTER LAKE. — FRANKLIN.

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
SOUTH HAMPTON.			
Frank O. Towle.....		South Hampton.....	
David T. Woodman.....		" ".....	16
Miss Clara E. Downing.....			
SOUTH NEWMARKET.			
L. H. Pinkham.....	Newfield House.....	South Newmarket.....	
SPRINGFIELD.			
S. P. Colby.....	Colby House.....	George's Mills.....	50
M. T. Chase.....	Star Lake House.....	West Springfield.....	20
Talant Boyce.....		Springfield.....	30
Enos Collins.....			
C. F. Woodward.....	Springvale Cottage.....		16
STARK.			
William T. Pike.....		Stark.....	10
Benjamin A. Veasey.....			
STEWARTSTOWN.			
M. B. Noyes.....	Camp Diamond.....	Stewartstown.....	
STODDARD.			
S. J. Harrington.....	Central House.....	Stoddard.....	20
B. Griffiths.....			20
STRATHAM.			
David Jewell.....		Stratham.....	10
Charles A. Wiggin.....		Exeter.....	
George B. Wiggin.....		Stratham.....	4
Mrs. Sarah E. Taylor.....			
Dudley C. Littlefield.....		New Market Junction.....	
STRAFFORD.			
John M. Whitehouse.....	Blue Hill Cottage.....	Strafford Corner.....	
John M. Dow.....	Bow Lake House.....	" ".....	
Sarah J. Caverly.....		" ".....	
William W. Waleron.....		" ".....	
Gilbert Shaw.....		Centre Strafford.....	
A. P. Wentworth.....		Strafford.....	
SUNAPEE.			
Lake Sunapee Hotel Co.	Ben Mere.....	Sunapee.....	150
Francis M. Dana.....	Lake View.....	".....	110
John Putnam.....		".....	100
F. E. Colby.....	Sunapee House.....	".....	20
George W. Colby.....	Hillside Farm.....	".....	20
George Dodge.....	Maplewood House.....	".....	20
John Y. Gardner.....	Prospect House.....	".....	20
Chase & Martin.....	Pleasant Home.....	George's Mills.....	60
E. P. Stickney.....	Solid Comfort.....	".....	12
E. G. Chase.....	The Elms.....	Sunapee.....	
N. P. Barker.....		".....	
E. R. Sargent.....		".....	25
John S. Whipple.....	Straw Cottage.....	George's Mills.....	12
L. F. Bartlett.....		".....	20
John C. Purington.....		Sunapee.....	14
SURRY.			
D. B. C. Hill.....	Hotel Surrey.....	Surry.....	15
E. H. Joslin.....	Joslin Farm.....	".....	
Daniel Wilder.....	Sunny Side.....	".....	8

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
SUTTON.			
Keysar & Putney	Prospect House	North Sutton	30
W. P. Sargent	The Elms	"	30
John Pressey	Meadow Farm	"	25
John H. Keysar	Twin Pine	"	20
Henry H. Bell	Maple Cottage	"	14
J. G. Huntoon	Huntoon House	"	25
C. E. Hosmer	Penacook	"	18
George Bailey	Keysar Lake House	"	16
C. H. Kohlbreusch, Jr.	Hillside Farm	"	12
James M. Sargent	Woodbine	"	12
Henry V. Little	"	"	14
Fred A. Felch	Brookside Cottage	"	12
Orrin M. Humphrey	Pleasant View	Sutton	20
SWANZEY.			
F. P. A. Kinson	Maple Hill Farm	Swanzy	30
C. H. Holbrook	Highland House	"	30
TAMWORTH.			
Mark E. Robertson	Chocorua House	Tamworth	60
A. E. Wiggin	Wiggin House	"	50
N. H. Varney	Woodbine Cottage	"	18
Albion Blaisdell	Fair View	"	15
L. M. Schenk	Eagle Cliff	"	30
J. S. Remick	Rest Cottage	"	10
Lowell Ham	"	"	20
Otis G. Hatch	Riverside Cottage	"	12
George W. Roberts	"	"	10
L. D. Blake	Sunset Cottage	"	12
J. A. Wiggin	Robinson Cottage	"	12
J. R. Perkins	"	"	14
Frank Blaisdell	Beechwood Cottage	"	30
Kate Sleeper	Woolancet Farm	"	25
Charles H. Remick	Wankanete	"	9
Nathaniel Berry	Maplewood Cottage	"	10
Augusta A. Stevenson	"	"	10
David Morrill	"	South Tamworth	10
George C. Whitney	Willow	Tamworth	10
William Perkins	"	South Tamworth	10
TEMPLE.			
Mrs. G. D. Young	Mountain View	Temple	25
Mrs. Josiah Fisk	"	"	10
Mrs. E. E. Colburn	Pleasant View	"	15
Mrs. D. C. Bragdon	Highland Farm	"	12
Mrs. E. G. Shedd	The Chestnut	Temple	11
Mrs. N. Holt	"	"	11
Mrs. S. B. Farrar	Forest Farm	Wilton	11
THORNTON.			
A. H. Kendall	Kendall House	Thornton	20
J. Parker	Hix Mountain	Woodstock	35
W. Merrill	"	Thornton	35
TILTON.			
Henry Q. Dalton	Lakeside House	East Tilton	35
Mrs. Lydia C. Sanborn	Lakeview	"	25
Nelson A. Philbrook	Riverside	Tilton	25
George A. Philbrook	Philbrook	"	45
W. H. Rollins	The Elms	East Tilton	20
Nelson H. Elms	"	"	40



LITTLE SUNAPEE LAKE. — NEW LONDON.

SUMMER HOTELS AND BOARDING-HOUSES. — *Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
TROY.			
John L. Perry	Monadnock House.....	Troy	30
TUFTONBOROUGH.			
D. D. Wingate.....	Wingate Farm.....	Melvin Village.....	30
Charles Wiggin.....	Maple House.....	Mirror Lake.....	25
Joseph C. Blake.....	Lakeside	"	25
John A. Edgerly	Edgerly House.....	"	10
Mrs. C. H. Shepard	Lakeside Cottage	Melvin Village.....	12
Francis Straw	Fair View	"	16
G. E. S. Dearborn	Enon.....	Tuftonboro' Centre.....	14
C. W. Purkham.....	Bald Peak House	Melvin Village.....	20
Jacob Hodgdon	"	"	
D. M. Smith	"	Tuftonborough	
Frank Libby	"	"	
UNITY.			
W. S. Upton.....	Unitage House.....	Unity.....	75
Wm. H. Whitmore	Elm Dale.....	Claremont.....	10
E. H. French	Maplewood House	Unity.....	
H. H. Roundy	"	"	
J. E. Reed	Hillside Farm.....	"	
WAKEFIELD.			
R. H. Pike	Union House.....	Union	20
W. F. Merrow	Davis House.....	East Wakefield	
Samuel Kershaw	Sunny Side.....	"	
J. C. Penny.....	Elm	Union.....	25
C. B. Remick.....	Sanborn House.....	Wolfeboro' Junction.....	20
James W. Hill.....	"	E. Wakefield Depot..	20
J. C. Philbrick.....	"	North Wakefield.....	14
A. Wentworth.....	Oak Hill Farm.....	Woodsman	40
Henry C. Tibbetts.....	Elmwood Inn	Wakefield	10
L. G. Waldron.....	Valley Grange	North Wakefield.....	30
H. B. Fellows	Maplewood Inn	Wolfeboro' Junction.....	15
C. H. Garland	"	Union.....	35
John Kimball	Maple Ridge.....	"	
Alvah S. Garland	"	Wolfeboro' Junction.....	50
Hiram W. Hutchins	"	South Wakefield.....	
John F. Garland	Garland House.....	Wakefield	
John F. Farnham.....	"	"	
Asa Brown	"	"	
Miss H. L. Frobisher.....	"	E. Wakefield Depot..	35
Mrs. Susan C. Davis	"	Wolfeboro' Junction.....	20
John W. Kimball	"	"	
George F. Piper	Lovell Lake.....	Woodsman	
Isaac W. Fellows	"	North Wakefield.....	
John D. Waldron	"	"	
H. R. Waldron	"	"	
Peter C. Young	"	"	
WALPOLE.			
C. R. Crowell.....	Elmwood House	Walpole	75
George E. Sherman.....	Dinsmore.....	"	50
Miss Eliza Barrett	"	"	30
Henry A. Huntley	Cold River House.....	"	12
Mrs. M. H. Blake.....	Blake Cottage.....	"	
Miss Harriet C. Hodgkins	"	"	
WARNER.			
M. M. Fisher	Hillside Farm.....	Warner.....	20
A. J. Hook	Kearsarge Hotel	"	40
Walter Sargent	Elm Farm.....	"	20
Mrs. Hollis Towns	"	"	20

SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
WARNER.—Continued.			
Miss Mattie Burbank.....	.....	Warner.....	10
Edwin George.....	.....	".....	.....
Fred C. Brockway.....	.....	".....	.....
Thomas W. Nelson.....	.....	.....	.....
WARREN.			
J. F. Thayer.....	The Moosilauke.....	Warren.....	100
A. L. Merrill.....	Merrill's Mountain.....	".....	35
D. F. Stetson.....	Stetson House.....	".....	8
G. H. L. Head.....	Moosilauke.....	".....	60
Rev. L. W. Prescott.....	Riverside House.....	".....	10
J. F. Merrill.....	Waternomee Cottage.....	".....	16
Mrs. George C. Clifford.....	.....	".....	.....
Prof. D. A. French.....	Maple Cottage.....	".....	8
A. M. Pillsbury.....	Clover Nook Cottage.....	".....	6
WASHINGTON.			
T. S. Stowell.....	Lovewell.....	Washington.....	22
H. B. Millen.....	Washington Farm.....	".....	32
H. M. Bowman.....	Danforth House.....	".....	.....
A. T. Wright.....	Fisher Farm.....	".....	15
WATERVILLE.			
S. B. Elliott.....	.....	Waterville.....	.....
WEARE.			
Mrs. S. E. C. Allen.....	Allen House.....	Weare Centre.....	30
Charles W. Everett.....	Everett House.....	North Weare.....	10
Henry Davis.....	Elm Farm.....	".....	18
H. O. Chase.....	Pinnacle Farm.....	".....	20
Eben B. Bartlett.....	Mountain View House.....	South Weare.....	25
H. R. Nichols.....	.....	.....	.....
Elijah Dow.....	Forest Farm.....	North Weare.....	14
J. L. Dow.....	Prospect House.....	".....	10
B. E. Hollis.....	Hollis House.....	".....	20
WEBSTER.			
Charles H. George.....	Long Pond.....	Webster.....	12
Andrew J. Flanders.....	Oakland Farm.....	".....	25
Joseph B. Thurber.....	Highland Farm.....	Mast Yard.....	18
W. F. Wadleigh.....	Ridge Farm.....	Webster.....	15
Tyler C. Sweatt.....	Glen Cottage.....	".....	15
Henry F. Pearson.....	.....	".....	.....
Daniel Scribner.....	.....	".....	.....
F. B. Sawyer.....	.....	".....	.....
James Goodhue.....	Grove Hill.....	".....	8
J. L. & H. H. Gerrish.....	.....	Mast Yard.....	8
WENTWORTH.			
J. W. Hitcher.....	Wentworth House.....	Wentworth.....	.....
William C. Pillsbury.....	.....	".....	8
Van Merrill.....	.....	".....	10
George Plummer.....	.....	".....	16
F. D. Elsworth.....	Brookside Cottage.....	".....	6
Alphonso Brown.....	.....	".....	8
Laura B. Elsworth.....	.....	".....	6
Francis E. Goodell.....	.....	".....	12
Edward G. Tenney.....	.....	.....	.....
WESTMORELAND.			
George Cobb.....	Pyncheon.....	Westmoreland.....	.....
William Brown.....	Brown's Cottage.....	".....	10



MASSABESIC LAKE. — MANCHESTER.

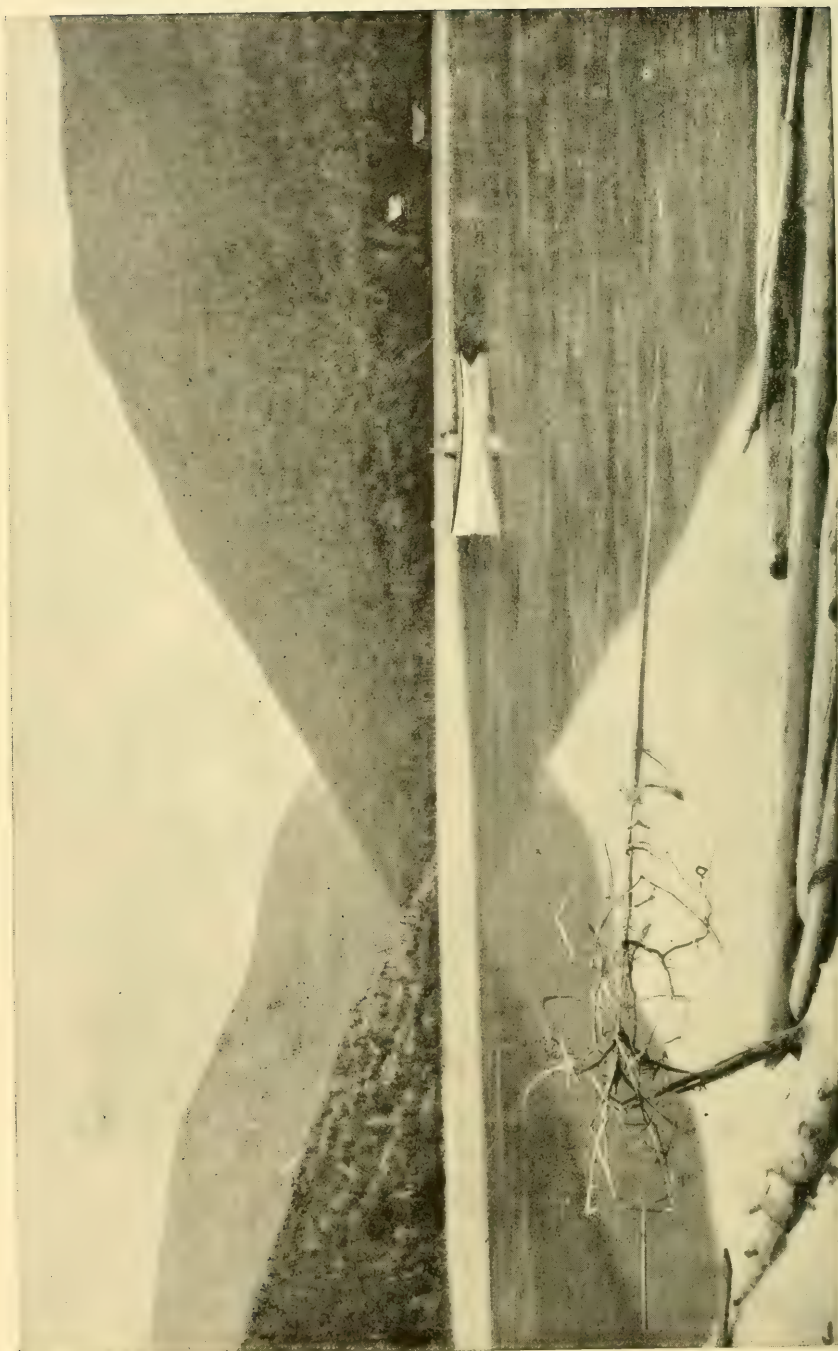
SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
WESTMORELAND.—<i>Con.</i>			
Mrs. Isaac Derby.....	Derby House.....	Westmoreland.....	12
N. Littlefield.....	Pleasant Hill Farm.....	".....	
WHITEFIELD.			
M. F. Dodge & Son.....	Mountain View.....	Whitefield.....	85
H. W. Fiske.....	Fiske House.....	".....	40
H. J. Bowles.....	Kimball Hill.....	".....	
Ira A. Mussey.....	Pond View Farm.....	".....	15
J. A. Goodwin.....	Prospect Cottage.....	".....	14
Mrs. E. M. Patten.....	.....	".....
H. M. Leonard.....	.....	".....
James Hunt.....	.....	".....
WILMOT.			
Dr. Joseph Hicks.....	Winslow House.....	28 School Street, Bos- ton, Mass.....	100
WILTON.			
S. B. Senter.....	Everett House.....	Wilton.....	75
Levi Putnam.....	Grove.....	".....	
E. P. Hutchinson.....	Pine Cliff.....	".....	
Charles Moore.....	Summit Cliff.....	".....	
A. D. Abbott.....	Abbott Hill.....	".....	10
Rodney Perlham.....	Highland Farm.....	".....	
R. M. Moore.....	Sunset Bank.....	".....	12
Charles Wilson.....	.....	".....
G. M. Boynton.....	.....	".....
Harvey Barnes.....	.....	".....
E. C. Curtis.....	.....	".....
W. W. Burton.....	.....	".....	20
WINCHESTER.			
E. A. Winter.....	Winchester Hotel.....	Winchester.....	
Henry Courillard.....	.....	".....
WINDHAM.			
J. W. Dinsmore.....	Lake View House.....	Canobie Lake.....	20
Mrs. M. E. Call.....	Elm Farm.....	Windham.....	20
Mrs. E. M. Cutting.....	Pine Hill Cottage.....	South Windham.....	16
J. A. Moore.....	Sunset Farm.....	Londonderry.....	15
G. W. Noyes.....	Noyes Farm.....	Canobie Lake.....	18
G. W. Johnson.....	.....	".....
M. R. Page.....	.....	".....
Mrs. J. S. Clark.....	.....	Windham Depot.....	12
Abel Dow & Son.....	Granite Grove.....	Canobie Lake.....	
H. E. Reynolds.....	.....	West Windham.....	
J. G. Bradford.....	Willow Cottage.....	Windham.....	10
WOLFEBOROUGH.			
Charles H. Rollins.....	Pavilion.....	Wolfeborough.....	
Daniel Horn.....	Belleview.....	".....	
Levi Horn.....	Glen.....	".....	40
C. W. Gilman.....	Lake View.....	".....	20
J. H. Warren.....	Bay View.....	".....	
John L. Wiggin.....	Maple Cottage.....	".....	14
Mrs. R. R. Davis.....	Elm House.....	".....	
W. B. Randall.....	Randall House.....	".....	15
H. B. Stewart.....	Stewart House.....	".....	20
W. B. Fullerton.....	Pebble Cottage.....	".....	
S. A. Meadon.....	Willow.....	".....	25
W. D. Hersey.....	Hersey Cottage.....	".....	20
S. N. Furber, Jr.....	Fair View.....	".....	15
Daniel Cotten.....	Cotten House.....	East Wolfeborough.....	

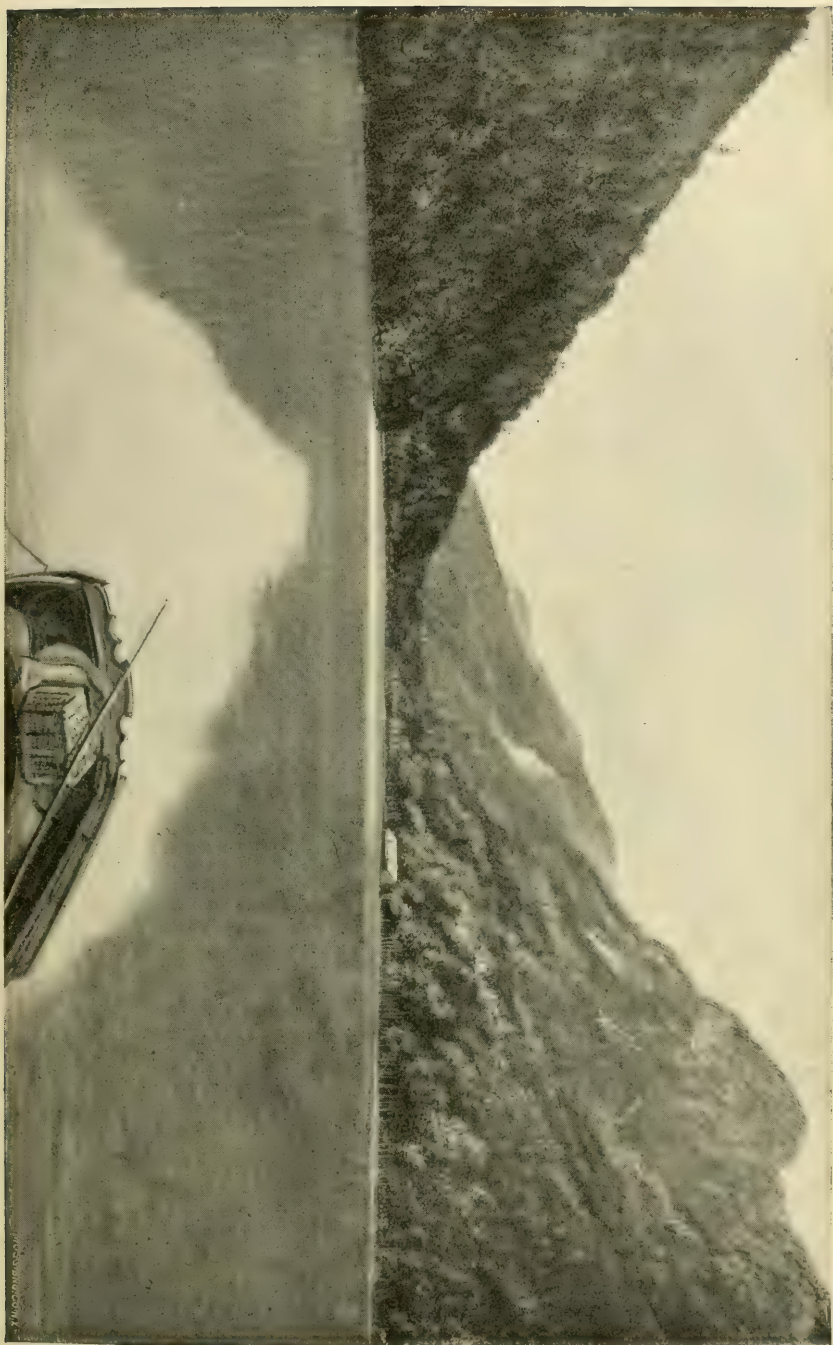
SUMMER HOTELS AND BOARDING-HOUSES.—*Continued.*

Proprietor or Landlord.	Name of House.	P. O. Address.	No. of Guests.
WOLFEBOROUGH. — <i>Con.</i>			
Henry Cotten		East Wolfeborough.....	
J. W. Piper		Wolfeborough	20
S. W. Fay.....			
WOODSTOCK.			
Buchanan & Willis.....	Deer Park	North Woodstock....	200
A. W. Sawyer	Fair View	" "	60
S. S. Sharon	Mountain View	" "	70
George F. Russell.....	Russell House.....	" "	75
Charles H. Russell.....	Cascade.....	" "	30
W. L. E. Hunt.....	The Innette	" "	20
C. L. Parker.....	Parker	Windham	25
J. H. Batchelder	Alpine House.....	North Woodstock....	90
N. Boynton.....	Pemigewasset Cottage...	Woodstock	
J. Parker	Hix Mountain House...	"	
W. F. Butler.....	Woodstock House.....	North Woodstock....	20
W. A. Smith.....		" "	23
M. H. Kendall.....	Central Cottage.....	" "	18

N. J. BACHELDER,
Secretary.



ECHO LAKE. — FRANCONIA NOTCH.



PROFILE LAKE.—FRANCONIA NOTCH.

AGRICULTURAL ORGANIZATIONS.

GRANITE STATE DAIRYMEN'S ASSOCIATION.

OFFICERS.

J. M. Connor, <i>President</i>	.	.	.	Hopkinton.
C. H. Waterhouse, <i>Vice-President</i>	.	.	.	Cornish.
G. B. Williams, <i>Vice-President</i>	.	.	.	Walpole.
J. L. Gerrish, <i>Secretary</i>	.	.	.	Webster.
N. J. Bachelder, <i>Treasurer</i>	.	.	.	Andover.

TRUSTEES.

O. M. Tenney, <i>Rockingham County</i>	.	Hampstead.
A. B. Locke, <i>Strafford County</i>	.	Barrington.
G. S. Philbrick, <i>Belknap County</i>	.	Tilton.
L. T. Brown, <i>Carroll County</i>	.	Tuftonborough.
J. G. Tallant, <i>Merrimack County</i>	.	Concord.
W. E. Gay, <i>Hillsborough County</i>	.	Hillsborough.
D. W. Rugg, <i>Cheshire County</i>	.	Sullivan.
C. P. Rossiter, <i>Sullivan County</i>	.	Claremont.
W. D. Baker, <i>Grafton County</i>	.	Quincy.
L. T. Hazen, <i>Coos County</i>	.	Whitefield.

SECRETARY'S REPORT.

While many have predicted that dairying would be overdone, we find no decline, but a positive quickening in the market, both East and West, at the time of making this report (October 20th).

The causes, in part, may be only temporary, viz.: local drought in the Western States; but the rapid development of the feeling against bogus products unlawfully sold, both East

and West, has met with favor among all dairy and creamery-men and consumers of butter generally. Law-breakers have been vigorously followed in this State until dealers are not inclined to take out licenses, and the traffic seems at a standstill to-day. This gives a place for just so much more genuine butter, and more, for people who have tasted for the last few years only with feelings of uncertainty, now require more butter, in proportion with the increased confidence in what they are eating.

With plentiful general harvests, and an unusual store of hay, rowen, and corn, we see no reason why dairymen may not expect soon to enter one of the most prosperous years known since the war. At present a preliminary survey of a railroad to the New Boston creamery, the steady growth of the Guernsey dairy at Contoocook — the product of both of which largely goes out of the State — with the feeling of confidence and push on the part of coöperative establishments, indicate an increase of such manufacture, while the steady growth of our manufacturing towns and cities encourages those who have special customers for private dairy products.

We feel that the meetings held during the year, a report of which is herewith submitted, and which has been quite generally published by our agricultural papers, have been very helpful to the dairymen of the State, and we ask that they may continue to give that encouragement to the Granite State Dairymen's Association which is given to similar organizations in other dairy States.

MEETING AT LANCASTER, NOV. 25, 1890.

Upon invitation of the Grange, through W. R. Stockwell, the association visited this locality in the eastern part of Lancaster, and held a successful meeting in a thrifty village known as "Grange."

The meeting was called to order by Past Master Stockwell, who introduced President Connor, who remarked: I hope

that in exchange for the facts which members of the association hoped to impart for the benefit of the farmers present, others of equal importance may be brought out in the discussion for our mutual benefit.

As this was the first meeting of the association in Coös county, the president briefly explained the objects and work of the association and the advancement which had been made in private dairies and creameries since the association was formed. He thought the improvement largely due to the discussions carried on by the association, Board of Agriculture, and the Grange. He also spoke briefly of the starting of a new creamery in his town growing out of efforts made by the secretary of the Granite State Dairymen's Association, in calling the attention of Massachusetts parties to the superior character of the dairy stock of Hopkinton and vicinity, which sprung from a pure Alderney or Guernsey bull and heifer brought into town by Joseph Barnard's father.

The president then introduced Secretary J. L. Gerrish, of Webster, who addressed the meeting for half an hour on "Dairy Stock."

The speaker did not advise farmers generally to spend large sums in purchase of thoroughbred stock, but to breed in dairy lines with pure bulls and the purchase of grade females of the same breeds, as good as could be had by buying young females within the limits of their means.

A good cow is as necessary to dairymen now, as good machinery is indispensable to the manufacturer.

The best take no more room, and little, if any more feed, and there is great satisfaction in owning such stock besides the profitableness of it.

Mr. Wm. Freeman said he had been interested in the remarks of the secretary. He would separate the cheese from the butter cows, and grade up from good cows, increasing the feed and care as he approached the thoroughbred.

Mr. Way thought that a good butter cow ought also to make good cheese, although he was not sure that they would make as much of it.

W. D. Baker believed the secretary was right in urging the importance of having cows adapted to the work required. He had figured carefully from such statistics as he had, and believed that a large proportion of the cows in the State could not be fed at a profit.

MR. R. CARTER: How may we know when we have the right kind of stock?

THE PRESIDENT: By testing the milk; we should not trust to guesswork.

Treasurer N. J. Bachelder was next introduced. He said that it was a matter of congratulation that 5,000 cows had been added to the dairy stock of the State, and ten or fifteen creameries added within the last year. There are thirty-nine creameries running to-day, and two or three more about ready to start. Private dairying has also been on the increase and their products are improving in character and quality.

He did not propose to instruct dairymen how to feed in individual cases, but to call attention in a short "chalk talk" to certain underlying principles. He called attention to charts showing the German tables of feed and proportionate values. Although not infallible, they had been compiled as the result of a very large number of experiments. The chemist could as readily take different feeds apart and separate them as readily as a farmer can sort apples, or potatoes. Certain results can be attained thus and rations balanced properly from such feeds as the markets afford, thus making the proper proportion of albuminoids and carbohydrates, according to the kind of work required of the stock we are feeding.

Different rations of the same cost would make a change of ten per cent in production, according to the way the ration was balanced.

Mr. Way asked why cows gave poorer milk in the fall?

Mr. Bachelder said he was not sure they did, if fresh cows.

QUESTION: How about feeding cotton-seed?

ANSWER: I would not feed it too freely at first as it is a heavy feed.

QUESTION: Would you not feed any grain moderately at first?

ANSWER: Yes.

Mr. Freeman asked if he could make good butter from ensilage?

ANSWER: Yes, from good ensilage.

A rambling debate on feeding generally was continued for some time to the close of the afternoon meeting.

EVENING SESSION.

The time of evening was mostly taken by the president and W. D. Baker.

DAIRY DETAILS.

W. D. BAKER, QUINCY, N. H.

A short time ago I received from the secretary of our association an invitation to speak at a meeting somewhere in Coös county some time this month, and in the same letter he informed me that the subjects of breeding and feeding had already been assigned, and asked me to take the milk from the milk pail through the various manipulations to the final object of the dairyman, namely, gilt-edged, golden butter ready for the market—that is, to enter into the details and the whys and wherefores of butter-making.

Now I am always glad of an opportunity to meet my brother dairymen and have a little experience meeting with them; but I must confess that the subject assigned me for this meeting was one about which so little was really known that I felt some hesitation about attempting to talk to you upon it; but if we don't try to profit by the experience of others, and keep our respective talents done up in napkins, we shall soon be left far behind in the race of progress; so I have come both to give and receive.

I notice from the list of subjects selected for discussion at this meeting that we are to consider butter-making the particular object of the New Hampshire dairymen, rather than the production of milk for the market, or for making cheese; and with this in view, the subjects chosen are breeding, feeding, making, and the utilization of the by products.

Breeding is very important, for a first-class article cannot be produced from poor material and you cannot make gilt-edged butter from the milk of poor cows; neither can enough be made per cow, to pay the cost of the feed alone, from the average cow of this or any other State, for the cow that will not make more than one hundred and fifty pounds of butter per year (and this is much better than the average), will not pay for her keeping as a butter cow, for it will cost more than twenty-five cents per pound aside from the expense of making, so you see that breeding has a great deal to do with successful dairying.

Feed is likewise of great importance, for even a good cow cannot produce a profit unless she is furnished a sufficient quantity of proper food and drink; but after the milk is produced, success depends upon the quantity and quality of the butter obtained therefrom, and this in a great measure depends upon the dairyman himself.

A city friend once said to me, "I don't see what you folks find to talk about at your dairymen's meetings, butter-making is simple enough. All you have to do is to put the cream into the churn and churn until the butter comes."

I replied that his question reminded me of the old lady who said that for her part she could not see why folks made such a fuss about papering a room. "All you have to do is to stick the paper at the top and smooth it right down."

But I was asked to begin at the strainer, and this part of the work cannot be too carefully done; but after all, much more depends upon keeping the dirt out than trying to strain it out after it gets in, for you can't strain out bad flavors and the milk can easily be spoiled by carelessness before it comes to the strainer.

Even with the greatest care some dirt will remain and you have only to visit some creamery and examine the bowl of a separator after a day's run, to fully convince you that the greatest care is none too much. In fact, the saying, "cleanliness is next to Godliness," is very applicable to every department of dairying.

The next question is, what to do with the milk after it is

strained. Now I am well aware that I am treading on dangerous ground for there are many systems and each has numerous advocates who are ready to take up cudgels with any one who does not think their particular method the best, so I shall endeavor to be impartial and leave it to you to judge what method is best for each individual, as what is one man's meat may be another's poison; but after all, no method will be a success except the dairyman is a success also.

There are three systems in use at the present time, viz. : the open pan, the deep cold setting, and the centrifugal separator (of which there are a number of kinds including the butter extractor), and they are all good in their place.

I do not believe any better butter can be produced by any system than can be made with the old-fashioned pans, such as our grandmothers used, provided the dairyman can control all the needful conditions of temperature, etc. ; but except for a very short period in the year this is practically impossible, and aside from this there are at least two other important reasons why the open pans must go — first, the large per cent of the butter fat is lost in the skimmilk and buttermilk by this method; and second, the amount of labor involved in taking care of the pans, etc.

An eminent authority estimates that on the average twenty per cent of the butter fat contained in the milk is lost in the skimmilk and buttermilk in private dairies, and as this means one pound lost (or at best, fed to calves or pigs) to every four pounds secured, here is a very large leak to be stopped. In practice it is next to impossible to effect a complete separation of all of the fat, and perhaps it is not desirable to do so, for the best flavored butter is that which is made from the cream that is first obtained, and numerous experiments have demonstrated that cream obtained from re-setting milk from which the greater portion of the cream has been previously taken, will make butter of the very poorest quality, but, while it may not be desirable to get the "last wrung drop," there is certainly no need of having so large a per cent of the butter fat wasted by ignorant or careless handling of the milk and cream. At the test at

Hanover, in January, 1889, by one method only, .19 of one per cent was lost in the skimmilk, .21 of one per cent by a second method, and .22 of one per cent by a third, which shows what can be done by proper care of the milk. I will speak of the buttermilk later.

Leaving out of consideration the open pans, we have two general systems before us, namely, the deep cold setting, and the centrifuge, and I will only say that both have many good points and it must be left to the individual to determine by actual trial which is the better suited for his circumstances. The high cost of the separator has prevented the great majority of our dairymen from giving it a trial, and they have therefore been obliged to resort to some method of deep setting. I understand that a separator has recently been placed upon the market at the low price of \$100, and this may work almost a revolution in the private dairy business; but for the present, as so large a proportion of our dairymen are using the deep setting system, we will confine our remarks to that method without, however, intending any slight upon the separator.

I shall not attempt to say which particular system of deep setting is the best, for I have no desire to bring a hornet's nest about my ears; but will take it for granted that you have some one of them, and we are now ready to take care of the strained milk.

The all-important question now is that of temperature, and, in my opinion, upon the correct solution of this problem depends in a great measure, the success of the private dairy. In fact, from the time you get the milk until the butter is marketed this question of temperature is first and foremost.

During the past two years I have made a large number of experiments, and I find I get the best results in obtaining the most complete separation when there is a difference of about 50 degrees F. between the temperature of the water and the milk when set in the creamery. I have obtained just as good results by setting the milk (which has been heated to 105 degrees F. by the addition of water at 135 degrees F.) in

running water at 55 degrees F., as with ice water at 40 degrees F. and milk at 85 to 90 degrees F.; and I will add that I have uniformly had good results from the addition of about $\frac{1}{10}$ warm water to the milk at setting, especially when the milk contained a large per cent of butter fat. I notice that these results correspond with those obtained by a number of dairy specialists, and if they prove correct the ice problem is in a fair way of solution.

Practically, all of the cream may be obtained in twelve hours by the deep setting method; but unless there is some necessity for skimming then, I prefer to let the milk stand twenty-four hours, as the cream is then of a greater density, and, while less in quantity, contains all the butter fats obtained in the shorter period and requires less work to get it into butter.

The cream should be kept at a low temperature until a sufficient quantity has been secured for a churning, and whenever any cream is added the whole should be thoroughly stirred. When enough has been obtained, and it should not be kept too long, the question of temperature again confronts us, for upon this and the consistency, or as it is usually termed the ripeness, of the cream depends the amount of butter fat you recover from the cream and consequently the amount lost. And it is in churning that the greatest loss of butter fat occurs, as a rule.

From a number of tests I am convinced that sweet cream cannot be churned at the ordinary temperature, say from 62 to 68 degrees, without a very large loss arising from the butter fat that will remain in the buttermilk.

If cream is to be churned at a temperature of above 50 degrees, it must be ripened to some extent, and the higher the temperature the more complete the ripening must be.

In one of the tests made at the Experiment Station last season, sweet cream was churned at a temperature of 49 degrees and only .47 of one per cent of fat was lost in the buttermilk; but it took three hours and thirty-five minutes to do it, and no remark was made about the quality of that butter.

In another test, a certain quantity of cream was divided into two equal parts and the first was churned while sweet and the other was ripened until it became acid and somewhat thick. Both lots were churned at the same temperature, 54 degrees (quite low, as you observe, and favorable for the sweet cream), with the following results: The sweet cream required 32 minutes for churning, and there was left in the buttermilk .81 of one per cent of butter fat; while the ripened cream took 13 minutes for churning, and only .26 of one per cent was left in the buttermilk. There is, however, quite a difference in the flavor or taste of sweet-cream butter and sour-cream butter; and we should endeavor to give our customers just what they want if possible, or, if we can, make them believe that our butter is just the kind they want. There is still another question in regard to the temperature and proper handling of the cream and that is, its effect on the natural color of the product.

In my opinion, if you have cows that will make June butter at any time of the year, it is not the fault of the cow if you have to use "dye stuff" in the winter.

Perhaps you may think this a bold statement; but I have often seen butter made from the same milk that had been divided into two or more equal parts and differently treated, that varied in color from only a trifle more yellow than lard, to that marked "perfect" by a committee of experts. It was made in January, and no coloring matter was used in any of the samples. I repeat therefore, that with good cows there is absolutely no need of coloring the butter at any season of the year.

Proper temperature, consistency of cream, and especially God's sunlight and pure air are the only materials necessary for butter color, provided you have good cows and give them plenty of suitable food and pure water. I say suitable food, as you cannot make June butter from some feeds, particularly cotton-seed meal. I think it is pretty well settled that butter should be gathered in granular form, the grains to be about the size of kernels of buckwheat, or less; while in this condition it should be thoroughly washed with pure water

(and here the temperature question comes up again), of a temperature that will keep the butter below 57 degrees; it will thus retain its granular form and be in the best possible condition for salting, which may be done with strong brine, or by sifting dry salt upon the butter while in its granular form, the method depending largely upon the amount of salt your customers require. Butter will only absorb about one half ounce of salt to the pound and if more is required it has to be added; I prefer to let the butter stand awhile after doing this in order that the salt may be diffused as completely as possible and thus do away with as much use of the butter worker as possible, as the more you try to work the salt in, the greater risk you run of injuring the grain of the butter. Of course some working will be required to expel the excess of moisture and render the butter compact enough for the print or tub, but don't overwork.

The temperature of the butter when worked should be 60 degrees, or a little less, in summer, and about 62 in winter; but it depends somewhat upon the feed, as butter made from some feeds is of much higher melting point than with other feeds. Cotton-seed meal especially gives a high melting point. Care should be taken not to leave too much moisture in the butter, as it will cause it to shrink in weight; commission men are fully aware of this fact and sometimes throw off quite a large per cent for shrinkage. It should not be too dry, however, as then it will be of poor grain and crumbly.

Gilt-edged butter, as a rule, does not contain more than 10 or 11 per cent water and about .5 of one per cent casein, and if you wish to make it you must take care that the buttermilk is thoroughly washed out and then that the excess of water is carefully worked out.

There are many details that I have passed over, but I will not try to enumerate them as I fear I have already severely tried your patience. Thanking you kindly for your attention, I will close by saying that I sincerely hope that you will thoroughly discuss this question of butter-making at this meeting, for as I told you in the beginning we come here to receive as well as give.

ANNUAL MEETING AT CONCORD, JAN. 20, 1891.

After brief appropriate remarks by President Connor, and words of congratulation, he then said: The first thing this forenoon is a talk by Mr. Bachelder, Secretary of the Board of Agriculture, upon a subject that is of interest to us all.

FEED FOR THE DAIRY.

BY N. J. BACHELDER.

Mr. President and Members of the Dairymen's Association:

For two hundred days in the year the 111,335 cows in the State of New Hampshire are fed at the barn, and the most economical production and combination of the various fodders and grains is a matter of great importance.

It is a very different question that confronts the dairyman of to-day from that with which he had to deal when our farms first came under cultivation. Then a fertile soil, rich in all elements of plant growth, produced heavy crops, and the farmer, forgetting that the bank from which he was drawing annual dividends would become exhausted, gave his entire attention to converting those crops into a marketable product in the shape of beef, pork, mutton, wool, or butter, with little regard for the economical combination of feed and less opportunity to supply any deficient element, had he the disposition to do so. The money thus obtained was carefully locked up in interest bearing securities, and as a result we have had rapidly increasing savings bank deposits and in many instances the deterioration of farm lands in about the same ratio. This is the condition that stares us in the face to-day, and renders intelligent and thoughtful action necessary on the part of the dairyman if he would succeed. Fortunately there are some things to afford us special aid in this matter, prominent among which may be mentioned the introduction of nitrogenous substances as articles of food, and a better under-

standing of the laws governing the uses of the different elements of feeding stuffs.

The experiment stations of this and foreign countries are annually expending vast sums of money in making investigations and we have the results obtained as our guide. While their efforts are properly directed in experimentation, it is the province of Dairymen's Associations, Boards of Agriculture, Granges, and kindred organizations to discuss with the people the laws which have thus far been formulated.

The chemist has been able to separate the fodders and grains into the elements of which they are composed, giving the amount of those elements in each instance. He tells us that the nutritive elements are albuminoids, substances resembling the white of eggs and containing about sixteen per cent of nitrogen. These are called the nitrogenous constituents. Carbo-hydrates, substances composed of starch and sugar. Also one other element, fat.

In addition to these are also found fiber and ash, but the three previously mentioned are termed the nutritive elements and exist in all articles of fodder and grain in varying proportions. It had been determined by costly experiments in foreign countries long before the establishment of experiment stations in our own, that animals require for the best results certain quantities of albuminoids, carbo-hydrates, and fat; and it is our business, as practical dairymen, to supply those elements in the cheapest possible manner, taking into consideration the location and resources of our farm, the health of our animals, and the material value of different fodders and grains. The quality of the product should also be taken into consideration, but this is more attributable to breed than to food influence.

The most economical fodder ration depends somewhat upon the location and soil of the farm, but there are very few instances where the dairyman should not depend upon ensilage as the main fodder. The prejudice against it has long ago subsided, and it has become an established fact that good ensilage will make as good milk and as good butter as any dry feed.

It has also been proven that two and one half tons of corn ensilage is equal in feeding value to one ton of herd's-grass hay, and it is our business to determine which we can produce the cheaper. On land which can be cultivated by horse-power, this ensilage can be grown and packed in the silo for \$2.50 per ton, allowing for the usual contingencies and accidents. An average crop of ensilage compared with an average crop of timothy hay makes the feeding value of the former about twice per acre that of the latter. Except upon farms too rocky to be cultivated by horse-power, there is no reasonable excuse for a dairyman in not using ensilage as the main fodder ration if he would reap the greatest profit.

Of the grasses grown for dairy feeding, the most valuable, all things considered, is the clover. It flourishes best on tenacious soils and stiff loams. It should be sown in the spring of the year and is often sown with perfect success on the late snows of March and April. In clover hay the nutritive elements are combined in almost a perfect ratio for dairy animals, and the only reason why it is not a perfect feed in itself is the fact that a cow would be unable to digest a sufficient amount to obtain the requisite quantity of albuminoids, carbohydrates, and fat.

In connection with the proper grains it is an excellent fodder, and the dairymen of the State would make no mistake in giving more attention to the production of clover.

Timothy grass forms a large proportion of what is commonly called English, or in some sections meadow, hay though it originated and was first cultivated in this country. It thrives best on moist, loamy soils, and is not well suited to very light, sandy lands. While it is doubtless the most profitable grass to grow for the market, there are other grasses which should receive a portion of the dairyman's attention.

Redtop is a grass familiar to every farmer in the country. It is the herd's-grass of Pennsylvania, while in New York and New England it is known by a great variety of names. It is well adapted to almost every soil, though it seems to prefer a moist loam. Its yield is less than that of timothy.

The time of cutting grass depends very much upon the use we wish to make of it. If for working oxen and horses it should stand until a little out of the blossom, but for milch cows it should be cut when very green. Well known authorities claim it to be worth nearly twice as much for the dairy when cut at this stage as when allowed to stand to the time of seeding.

Upon farms so rough and moist that ensilage cannot be profitably produced (the number of which is small), an excellent addition to the fodder ration can be produced in the form of oat and barley hay. No dry fodder equals this for the production of milk and butter. Barley hay will be of the better quality but less can be produced per acre. From three to five tons of oat hay can be produced on an acre and affords the best substitute for ensilage that we have. It should be cut at the first appearance of ripening, as a delay of two or three days greatly reduces the feeding value of the crop. Corn stover is worth more as a dairy feed than is sometimes supposed, and careful experiments have proven it worth three fourths the price of the best hay per ton. The coarser varieties of grasses which are produced upon nearly every farm, may be more profitably fed in connection with a proper grain ration than when fed by themselves, for a grain may be selected and combined with the fodder in such a way as to make a correct nutritive ratio.

In substance we recommend for a fodder ration, ensilage with a small quantity of hay. In the absence of ensilage, we should substitute oat or barley hay, and next in order of excellence for the dairyman, we should name clover followed with timothy and other grasses.

The grain feed would depend upon the fodder ration used. We have stated that animals require the elements of feed in certain proportions, and the experiment stations tell us that in the case of dairy animals that ratio should be one part albuminoids to five and four tenths parts carbo-hydrates. Whatever the fodder ration lacks of making this proportion should be made up in the grain fed.

We are assuming that a portion of the grain at least will be purchased, for in no other way can a dairy farm be made to sustain its fertility. The cost of the requisite elements in different grains and feeding stuffs will determine which to substitute, taking into consideration other conditions which we have mentioned.

Some articles must be selected rich in nitrogenous matter, and under this head we find cotton-seed meal, gluten meal, linseed meal, middlings, and shorts. There has existed a prejudice against all these articles of feed; but experience has proven that any of them can be fed in reasonable quantities without detriment to the animal or quality of the product. Cotton-seed meal takes a prominent place from the rich manurial value contained. It must be fed sparingly to animals for the first time, and always carefully, for an over-feed will cause bad results. Animals differ greatly in their digestive capacity and the amount each will digest must be determined largely by experiment. It is seldom profitable to feed more than three pounds per day to a cow of ordinary size, if we consider her continued usefulness in the dairy.

Gluten meal is not always eaten readily at first, but cows will soon become accustomed to it. It is claimed to increase the flow of milk, but many affirm that the solids in the milk are not increased in the same proportion. Shorts enter largely into the dairy feed of the country, furnishing the nitrogenous elements in a healthy combination.

Roots of various kinds are an excellent article of feed for dairy animals; and when we consider their healthy effect upon the system, it is quite probable that they can be profitably grown as a supplementary feed for a first-class dairy when ensilage is not used. We have grown and harvested crops of carrots for \$6 per ton and used them profitably in our dairy.

While animals should not be over-fed, they should be fed liberally. It requires a certain portion of the feed to sustain the waste of the system, and not much more of this, if the machine is running to its full extent than when doing less.

Every cow is born with a certain limit of production, and

until that limit is reached she is not doing her most profitable work.

It is true that breeding is the leading factor in fixing the capacity of a dairy animal, yet the best breeding cannot overcome the want of proper feed, and it will require but a few generations of starvation to reduce the capacity of the best breed to a level with scrub stock. Feed liberally, if you have to feed fewer animals. Feed so your animals will give milk ten and one half or eleven months in the twelve. It is best that a cow should have a brief rest, but if she has been correctly bred her feed should be such as to make this period short. Do not discontinue the grain suddenly when this time arrives, for a highly-bred dairy animal will be susceptible to sudden changes of any kind. Feed regularly, at the same time every day. Anything that excites or disturbs a dairy cow has an effect upon the secretion of butter fat, and therefore absolute contentment should be given her. The feeding should be done with so much regularity that thirty minutes before the feeding time will find the animals quietly chewing their cuds.

Our best dairymen now practice feeding but twice a day, giving the animals a longer time for rest, for the secretion of milk, and for digestion. After feeding has commenced in the morning, it should be continued until one half of the feed for the day has been given. This may require three hours or more. The same should be done at night, and in the meantime, the cows will have secreted more and richer milk than if frequently fed during the day.

A point of considerable importance, is the feeding of young heifers, both before and after they come into milk. While they should be liberally supplied with healthy food, they should not be given rich concentrated grains in large amounts. A heifer can be ruined for the dairy by an over-feed of corn or cotton-seed meal, while twice or three times the amount might do no harm fed to the same animal two years later. The third consideration we mentioned, was the manurial value of different grains, and this has an important bearing upon

the subject. When the farmers of New Hampshire are paying more than \$650,000 annually for commercial fertilizers, it would seem that this branch of the subject was worth careful consideration. It is our duty as dairymen to use all reasonable means to save and apply to our land the fertilizing material obtained by our feeding. Some grains, after serving the uses of the animal, have a much higher value in this direction than others. First on the list, is cotton-seed meal, furnishing four times the value of nitrogen, phosphoric acid, and potash, as does corn meal; gluten meal, furnishes three times; and shorts, twice the value of corn meal. Were their value the same for the production of milk and butter, this would be a matter of great importance in determining our economical combination of feed. The dairyman who feeds a cow during the 200 hundred days, 1,600 pounds of hay, 4 tons of ensilage, 600 pounds of corn meal, 400 pounds of cotton-seed meal, and 400 pounds of shorts, will have in fertilizing matter, if he has saved it, \$20.54. This is upon a basis of nitrogen at 17 cents, phosphoric acid at 6 cents, and potash at $4\frac{1}{2}$ cents per pound. The total amount represents the price which the farmer would have to pay for the same amount of plant-food delivered on his farm in the form of commercial fertilizers. In a large herd of cows this becomes a large factor. The same herd of cows fed upon hay alone, would leave but half the amount.

Professor Roberts, of Cornell University, is authority for the statement, that when the manure is carefully secured, the nitrogen, phosphoric acid, and potash therein contained, are worth, on an average, one half the value of the feed consumed. Careful attention to these facts will enable us to return to the soil some of the elements of which it has been robbed, without depleting our cash account.

In conclusion we would say, study the adaptation of your farm to the production of the various fodders, and produce the largest amount that can profitably be grown. Supplement this with nitrogenous grains purchased in the market. Become familiar with the composition of both fodder articles

and grains. Consider 100 pounds of timothy hay, not simply as 100 pounds of hay, but as $3\frac{1}{2}$ pounds of digestible albuminoids, and $48\frac{3}{4}$ pounds of digestible starch, sugar, and fat; consider 100 pounds of cotton-seed meal, as $31\frac{1}{4}$ pounds of digestible albuminoids, and $42\frac{1}{4}$ pounds of digestible starch, sugar, and fat. Know the composition of other grains in the same way. Then, knowing what proportion of each our animals need, we will be able to feed an economical ration. Save and apply the fertilizer obtained to the production of more fodder. Continue in this way with an eye single to success in the business, and you will increase your profits; your crops will increase, and you will have the satisfaction of knowing that you have caused "two blades of grass to grow where but one grew before," one of the proudest achievements of an American farmer.

THE PRESIDENT: We will now hear the report of the butter expert, Mr. Harris, of Boston.

REPORT OF THE JUDGE ON BUTTER EXHIBITS.

BY E. A. HARRIS, BOSTON, MASS.

Mr. President, Ladies and Gentlemen of the Granite State Dairymen's Association:

I appear before you the second time to award the points, based upon my judgment, of the exhibit of butter. In the first place allow me to say that I am disappointed not to see as large a display as at Plymouth last year. Last year I was very much gratified to see the large amount, and excellent quality of the exhibits; but this year, not only is it less in quantity, but I am sorry to see that it is inferior in quality. I presume one reason for this may be the high price of grain food that is purchased in the market, and especially of corn meal.

The total number of exhibits were twenty-five in butter. The first prize in creamery prints—there being only one entry—is given to the Hillside creamery, of Cornish, scoring eighty-eight points.

In creamery tubs, the Haverhill creamery scored ninety points, and the Hillside creamery also scored ninety points, and first and second prizes should be divided between those two. The Hillside creamery took the third prize, scoring eighty-nine points.

The sweepstakes was carried off by the Short Falls creamery, of Epsom, that scoring ninety-one points. I think that honorable mention should be made of 22 A, ninety points, and 31 A, eighty-nine points.

There was but one exhibit in dairy granular, as there was but one in the creamery, and W. D. Baker, of Quincy, gets the first prize.

In dairy tubs, A. H. Colby, of Tilton, gets first prize, eighty-three points; J. W. Pulsifer, of Holderness, second prize, seventy-four points; and W. D. Baker, of Quincy, third prize, sixty-four points.

In dairy prints, the first prize is allotted to Joseph Barnard, of Hopkinton, eighty-eight points; the second to A. H. Colby, of Tilton, eighty-six points; and the third to Mrs. J. W. Pulsifer, of Holderness, eighty-one points.

In cheese there were six entries.

For plain cheese the first prize is given to J. W. Pulsifer, of Holderness; and the first and second to T. S. Pulsifer, of Campton.

For sage cheese, the first prize belongs to T. S. Pulsifer, of Campton; and the second to J. W. Pulsifer, of Holderness.

The Pulsifer family takes the cake in cheese this year, as they did last.

If there are any questions that you wish to ask me in regard to the awards, I shall be glad to answer them.

MR. PHILBRICK: In looking over your points, I find that this whole exhibit scores lower than it did last year. What is the greatest general fault you find in this butter?

MR. HARRIS: The greatest fault is in the flavor. The first point that you look for in butter, is the flavor.

MR. PHILBRICK: Do you make a difference between aroma and flavor?

MR. HARRIS: No, sir. I always smell a piece of butter before I taste of it. I fix my judgment upon both.

MR. PHILBRICK: The flavor and smell are identical? That is, the one gratifies the sense of smell in the same proportion that the other does the sense of taste?

MR. HARRIS: Yes.

MR. PHILBRICK: You think that is true with gilt-edged butter?

MR. HARRIS: I think butter with good flavor has very nice aroma.

PRESIDENT: It is generally reported that our hay crop was well secured at a very excellent season, so this inferiority in the butter cannot be the fault of the quality of the hay. Do you attribute it to the fact that corn meal is higher in proportion to its feeding value than other concentrated foods, and hence is not fed so generally, — do you consider that to be the cause of the lack in flavor?

MR. HARRIS: I do, sir.

GOV. HOARD: I should like to ask you a question. It would be very interesting to know from the parties who made this butter, as to when those cows were fresh cows. Five or six months in gestation makes a great difference in the flavor of butter. And consequently, if you want to make fine-flavored butter, you have to put fresh cow's milk in it. May that not be a very important factor in this matter of flavorless butter in the winter? I do not know what the rule is here, whether these parties who have made this butter put on exhibition here, had their cows come in fresh in the fall or not, but I do know that this becomes a very important factor in the matter of flavor.

MR. HARRIS: I do not know as I could give you very much information on that point, that you have not already learned in the various dairymen's meetings.

THE PRESIDENT: That would not account for the difference in the flavor of the butter this year and last, for as far as that is concerned, it would not vary much from last year.

GOV. HOARD: It is impossible to make very fine flavored

butter unless you have new milk to put into it. Did you detect any flavor of the stable in this butter?

MR. HARRIS: No, I do not know as I can recollect any. But I very distinctly found the flavor of ensilage, and linseed, and cotton-seed, and that has brought down the score. I have no doubt but a great deal more butter can be made on such food, but it injures the price of butter some in the Quincy market.

MR. CHEESEMAM: I should be glad to ask the gentleman who has examined this butter, how he was able to detect the ingredients that he has mentioned as lowering the price of butter, and what butter it was that was produced by ensilage-fed cows?

MR. HARRIS: I do not know as I am able to say. I cannot carry these all in my mind. I will tell you the reason why I think some of this butter was produced from ensilage. It was my fortune to examine butter at St. Johnsbury, and also at Burlington, where we had large exhibits, and where I had to score the different points awarded. I asked the producers of some of the butter, if they fed ensilage, and they said they did. I judged by its having the acid taste.

GOV. HOARD: Then the flavor is aciduous from ensilage?

MR. HARRIS: Yes, sir; a sour taste.

GOV. HOARD: What flavor do you detect from linseed?

MR. HARRIS: It is hard to describe a flavor, and I do not know as I can.

THE PRESIDENT: Lack of flavor?

MR. HARRIS: No, sir; it has a distinct flavor.

THE PRESIDENT: I would like to ask the gentleman if he came across a garlic flavor?

MR. HARRIS: I am not familiar with that. I am only giving this as a result of my experience in selling butter. We have all grades of butter that pass through our hands. We handle all kinds of butter that will suit our customers. I find that our best customers do not like those flavors, and therefore I draw the conclusion that they must be injurious.

MR. CHEESEMAM: Mr. Chairman, the gentleman is ex-

ceedingly modest; but he must know that in the matter of experience, he and those engaged with him in the Quincy market, are very much our superiors, and we are very much indebted to them for the opinions they have expressed. Before this question is allowed to drop, I want to say a word. I judge from what he has said to us, that his experience in the use of ensilage has been limited, and has been confined to the poorer kinds of ensilage. Now it is a fact that the very best butter going into the New York market and some that is selling for the highest prices is produced from cows fed with ensilage. On examining the butter this morning, I had formed judgment in my own mind, which was substantially like the report that has been given us. I found some of the first prize butter whose flavor came out very much quicker the second time than it did the first. I got the ration from a producer of some of this prize butter, and have it here in my hand. I will read it: Cotton-seed meal, 100; cob meal, 100; shorts, 200; gluten, 150, and each cow gets an average of eight pounds a day of that mixture. He said he fed about five pounds of English hay each day. I asked him, "Do you feed any succulents?" He said, "I feed forty-five pounds of ensilage a day."

A MEMBER: I understand there are two kinds of ensilage, and the kind that this farmer has, perhaps, is the kind that does not bring out the sour or acid taste.

MR. GERRISH: I want to ask a favor. I notice that people sometimes like to hear stories. We have a gentleman with us who has come a long way from home to attend this meeting. I think he might tell us a story that I remember of hearing him tell, about a little Dutchman for whom he did a certain favor when he started in to make butter. Perhaps the Governor can tell us about it.

Gov. HOARD: Mr. Chairman and gentlemen, human nature is very much alike whether it is in a Dutchman or a Yankee. The story that Mr. Gerrish heard me relate was one by which I used to illustrate the value, and the money value—the clean, clear, money value—to any man of a bet-

ter dairy education, and I took this illustration as coming within the province of my own experience. I may say that for twenty years I have lived, moved, and had my being among my people, and I have had a good many experiences in striving to bring individual cases up to the knowledge of their own salvation, as it lies in the cow. As a consequence, I have had a good many different kinds of men to deal with. The following is an illustrative case, and it shows that, really, the plan of salvation is not so very high in the air—that it lies very close to, and almost within, man's make up, if he will only "get there."

A little German farmer, by the name of Carl Streigle, came into my office one day in Fort Atkinson, about fifteen years ago. I could see a great deal of earnestness in the man's face; a typical little sturdy Dutchman, he was. He said: "Mr. Hoart, I vant to talk mit you somdings about dis dairy pizness. I got me sixty acre farm; I got me frau; I got me six childers—I do tink somdtimes I got me too many childers; unt I got me mortgage, unt that mortgage it is the piggest von; unt I work hart into the night, unt I work as hart as I can; but I no get ahead—I no can make any money; unt I hear you speaks about the dairy pizness; unt I get me nine cows, unt they vas goot for nodings. Mine frau, she make some butter." And he went on to tell me how they took the butter to the store, and the man in the store stuck up his nose and said: "Dat butter, him do stink, unt there is everyding in it; unt I tink may be dat ist so. I don't know vat to do. Can you tell me somdings?" I looked Carl in the face, and I was touched by the simple, earnest, honest, direct way, that he was appealing for help. He said: "I can't go into dairy pizness like all dese oder fellows. I get me no money. I can't do noting." I said: "Carl, you can commence to commence, can't you?" "What vas that?" I said: "You begin, right down just where you are. If there is anything at all in this matter, it ought to be intensely practical; practical enough to take hold of anybody. You have got money enough to buy two kerosene

barrels?" "Kerosene barrels? ach, but the storekeepers sell me dose. I can puy dose." "Well, my friend, take those two barrels, stuff them full of straw, and burn out the oil. They will make you two tanks. Then you will take five dollars' worth of lumber—you have got a good well and windmill—now, take that lumber and build a little roof for a dairyhouse, over that well. Then we will make tanks out of those two oil barrels and put them under this roof, and the windmill will keep them supplied with fresh water. Then we will go down to the tanners and have some cans made, we will set the cans with the milk in them into the tanks, and we will see what we can do. The wife, she washes, she cooks cabbage, and you smoke, right in there where you have been trying to make your butter, and all the stinks there are, get into that butter. The storekeeper is right—plainly and severely right. But you start this right down here. It will not cost you fifteen dollars. We will get a little churn and see what we can do with this." Carl went to work, and did as I told him; and then I went home with him. The wife looked very suspicious, and said to Carl, "Dat Yankee is a humpug." But Carl had some faith in me, and that led him along. I showed him how to set his milk, and then said: "As fast as you skim the milk, put the cream into another can. Put the milk, after it is strained, into these cans, and the cream into those other cans. Set them into the cool water, and let your windmill pump all the cold water into it, constantly, that it will." And so in this little simple way, leading this man along into a channel whereby the science of it should become plain to him, I got him started so far. "Now," I said, "when you have got so much cream, let me know, and I will come down and churn for you, and we will pack it, and I will try to keep every step of the way within your understanding, and then you can run it yourself." So he sent me word that he had so much cream. I went over to the factory to get a little churn, and told them I wanted it for missionary purposes. I put it into my buggy and drove down to the German's house,

churned his butter, and showed him how he ought to churn. I took out a little twenty-pound tub and packed the butter in in it. Then he said, "Where will you sell that butter?" I said: "Carl, I am going to sell it in a butter market. Fort Atkinson is not a butter market. You must always sell your butter where there is a demand for good butter, and then there is some answer to your efforts. I will sell it in Chicago, to a commission merchant." "Gott in Himmel," he said, "I will never see dat butter again." I said: "Oh, yes, you will Carl. If you sell it to Mr. White, to whom does he sell it? It will eventually find its way into the hands of this same commission merchant, perhaps, and others will get the profit of handling it. Every man does business by trusting his neighbor. It is the man that does the smallest amount of business that trusts the least, and has the most suspicions of every other man." So I tried to give him some idea of commercial law. I made the butter, packed it, and sent it to Miller & Eldridge, in Chicago. I wrote them a letter saying: "I want you to sell this butter for just what it is worth in the butter market. It is the first fruits of righteousness of my German friend, Carl Striegle, and I want it as an object lesson. Sell the butter and send me an account of sale and a check for the amount." Butter was then selling for but fifteen cents in the home market. In two or three days back came an account of sale of that butter at twenty-six cents, I think, showing the freight, express, commission, etc., and also a check for the amount. I took this little check and account of sales in my hand, harnessed my horse, drove down to my German friend's little home, and went into the house. Carl was busy in the stable. He saw me and came into the house. "Well, Carl," I said, "the butter is sold, and here is the pay for it. Here is the amount that the butter sold for—twenty-six cents a pound." He gave a start, his eyes opened, the horizon began to look large to him, he saw the light. He caught his breath after a moment, seized the check, looked at it and then suddenly started, caught his wife, held the check up and shouted: "Lucette, Lucette! Meine Gott, dat ist no humpug!

dat is no humpug!" From that time the man started in earnest, and his success has been phenomenal. He began at the beginning, and is an illustration of that passage which says: "Except ye become as little children, ye shall in no wise enter the kingdom of Heaven," or the kingdom of the cow, either. He was teachable, without prejudices, without inherited notions. To-day he is a very prosperous dairyman; the owner of over two hundred acres of land, I think, and seventy-five cows; and all of those children—boys and all—are working together, amassing a large fortune. Every little while I get a package of butter, and on it is inscribed: "To my good friend who showed me how."

THE PRESIDENT: Ladies and gentlemen, we have a large amount of work to accomplish to-day, and we must improve the time. The next subject on the programme is "The Pig," which was assigned to me.

THE PIG.

BY J. M. CONNOR, HOPKINTON.

I have prepared no lengthy paper on this subject and have been unable to give it such consideration as its merits demand. I shall therefore occupy but a few moments of your time. I anticipate much, as no doubt you all do, from him who is to follow me. From his practical experience he will have many things to say that will be new and interesting upon this subject.

I am aware, as no doubt all of you are, that in order to make dairying profitable, we must take into consideration everything relating to it; we must make profitable everything in the line of by-products, in order to make this industry a success. From my own experience, I am satisfied that one of the important branches, as a paying matter, is that of pork raising.

• We have listened this forenoon to some statements in relation to the progress made in dairying in New Hampshire

within the past six or eight years. But are we aware of the progress that is being made in the pork production?

Not many years have elapsed since, when you came into this market, or any of our cities during the winter months, you would see upon the sidewalks in front of meat markets, and at the freight stations, stacks of Western hogs, of all sizes and shades of color. Now it is quite a number of years since I have seen Western-dressed hogs in this market.

This is evidence that we are giving more attention to the subject nearer home, and that we are supplying the market with our home production.

I realize that as a general rule, we have not much attachment to this animal, as he is rather an offensive creature. We form attachments for the horse and cow, and become strongly attached to them; but not so with the pig. He is given a home in some by-place, some foul and filthy place out of the way, and there is very little regard paid to his welfare. But do you realize the commercial value of this little, filthy animal? Of all the farm products raised in this country, only two exceed that of our pork products—the cotton and the wheat products. The annual exportation of hog products from this country, exceeds the aggregate of the cattle, horses, mules, and sheep, fresh and canned beef, tallow and mutton, corn, and all other bread stuffs, excepting wheat and flour. New Hampshire heads the list of States, in the value per head of live hogs, in the United States. These statistics certainly surprised me, and I think will give you a good illustration of the value of our pork production.

There is no other one thing in which there has been so great a change, as in the raising of pork. I recollect, but a few years ago, you could find only a very few pigs fattened upon the farm. Occasionally, where a man kept a cow, he might keep a pig; but he was not able to go into the pork business much. He might raise pork for his home use, and that was all. The farmers as a general rule, kept them until they were twelve, eighteen, or twenty months old. In this there has been a change. More than half of our pork, at the

present time, is sold when the pig is under ten or twelve months of age. That is a movement in the right direction. I have given this matter some thought in connection with my dairying, and I have kept account of the receipts and the cost of production, and I am satisfied that there is no animal upon the farm that is as profitable as the pig, taking all things into consideration. If any one disagrees with me in that statement, and we have time during this meeting, I should be happy to have the matter discussed. I make this further statement, that the pig, in connection with dairying, is more profitable than the cow, when you consider the labor that is involved in the care of the two animals. I am now keeping eight pigs in connection with ten or a dozen cows, and I am also raising a calf, and so far, I had rather attend to those eight pigs than that one calf. There is not so much labor in it.

What will those eight pigs be worth when they are nine months old? and what will that calf be worth when he is two or three years old? Now I want you dairymen to think about this, and utilize your by-products in raising more pork. Keep account of the expense, and remember that it is with pigs as with everything else—in order to profit the most by them, we must keep them growing. The old custom was to have a store pig or a store hog, and not commence to fatten him until he was fifteen months old, perhaps. Previous to that, he would be squealing all the time for something to eat; but the owner would give him nothing except a little swill, up to a certain time, and then commence to fatten him. What would you think of that method applied to the beef creature. We have applied it altogether too much, and we need to remember that we must force the animal right along. There is where the profit lies. Have none of this store pig business; force the animal right along until fit to kill, and then kill him—no matter what time in the year it is. Remember, too, that the young animal will lay on fat a great deal faster than the older one, and the profit is greater if killed when he is young. He gains less as he grows older. That is an important thing to bear in mind, but I have not time to enlarge upon it here. I

want to say that I know of a great many of our leading dairy-men who make but little account of pork production, although they think it is well enough to keep them as a matter of necessity. I do not look at it in that way. I have thought sometimes that it would be a good plan to keep some cows because we have hogs.

VOICE: Pretty good.

MR. CONNOR: Now I have kept account of the cost of my pigs, and I find that in those cases where I have kept an account, the pork cost me about three and one half cents a pound for the corn and everything besides the milk, selling the pigs when nine or ten months old, and at the price for which pork sells, you see that leaves a very good margin for the skimmed milk and the labor.

I do not propose to say much more upon this subject. I wanted to call your attention to the profits that could be made from our pork products, and I leave the subject to be more thoroughly ventilated by the gentleman who is to follow me, my friend, Mr. James Cheeseman, of Southborough, Mass., of the celebrated Deerfoot farm.

MR. HUMPHREY: What view would you take of the pig as a manure-making animal on your farm?

MR. CONNOR: I never gave that especial thought. In my estimate I did not consider the value of the manure, although I do regard it, of course, as of very high value, and as one of our best means for making manure.

I now have the pleasure of introducing to you Mr. James Cheeseman, who will speak to you on "Pork Products."

PORK PRODUCTS.

BY MR. JAMES CHEESEMAN, SOUTHBOROUGH, MASS.

Mr. President, Ladies and Gentlemen:

This morning, Mr. Philbrick presented a great many practical thoughts to us, in relation to the creamery business. The great thought running through the whole of his talk —

the one that struck me the most at least — was the immense improvement during the last five years, in the quality of the butter produced. I am now reminded that there has been a great improvement in the standard of living, throughout this country; and not only here, but throughout the entire English speaking world.

Your president has told you that the first step towards success in the keeping of pigs, is a change of feeling in regard to the animal itself. If we wish to be successful in pork growing, we should no longer regard the pig as a scavenger, as is the too prevalent opinion to-day; but we should treat him with that same kindness and consideration which we give to cows.

Your president has told you, and I agree with him, that the pig is the most economical producer of fat, of any of the live stock on the farm, and it is the opposite of economical husbandry to treat him in the way we have been accustomed to do in the past. I think we have reason to believe, from what he has told us concerning the supply of your markets here in Concord, that the change of feeling towards this animal has already begun to take place.

It is much easier, now-a-days, to fat the young pig and place it upon the local markets of the New England States, than it was formerly. But in this connection I would say, do not let us deceive ourselves. We are not very much ahead of the West in this particular.

But, as I was going to add, let us not deceive ourselves with reference to Western pork. Three years ago I had occasion to write to a large Western firm, to obtain information with reference to the average age, and dressed weight of their pork products for the export market. As near as I can remember, the heaviest of them weighed only 173, or 178 pounds—somewhere below 190 pounds—dressed weight, and they were produced at a cost of from $5\frac{1}{4}$ to $5\frac{1}{2}$ cents a pound. I think those statistics were for the year ending June or July, 1887, whenever their books were closed. This fact evidences the large and general treatment of pigs

out in the West, that enables this large packing house to do the business in the export markets of the world, that it does.

Good breakfast bacon for the markets is now no longer the problem to the Chicago packing houses that it was ten, and even five years ago. A short time ago, I went into a well known house in Boston to get some lunch, and I was particularly struck with the nice bacon that was placed before me. I knew the manager, and I called him aside and inquired where he obtained his fine bacon. He replied that it came from a well known Chicago packing house, one of the four great packers in Chicago. So let us not deceive ourselves, Mr. Chairman, in regard to the quality of our pigs as compared with the Western pigs. The Westerner, it is true, is a greater distance from market, but that fact makes him keen, energetic, and always on the *qui vive* to obtain whatever advantage he may.

I want to refer for a moment or two, to the great opportunities which you have in this State for producing pork of a high quality. When Mr. Philbrick was speaking this morning, about the standing of New Hampshire butter, I was particularly struck with the fact presented with reference to the relative standing of New Hampshire and Vermont creameries. However, I must say that the very best dairy butter I have ever tasted in the New England States, was produced in Massachusetts and Vermont. The Vermonters have an advantage over you there, but certainly you have a great advantage in the matter of creamery butter. I have the greatest pleasure in bearing testimony to the quality of the butter produced at the Hillside creamery. As a matter of fact, we are paying two cents a pound more, and we do it cheerfully, for the butter produced at the Hillside creamery, than we do for butter from the other factories from which we draw our supplies.

It is very desirable, in connection with pork raising, to feed to some extent with the by-products of the dairy, but it is not well to follow that feeding too closely. Some of the directors of our experiment station have adhered very closely to the

combination of skimmed milk and corn meal. This combination, so far as it concerns the food ratio, is a very excellent one; but the fats in that combination are too simple for the production of the highest class of pork. It does not produce as high a grade of pork as that combination which includes a little bran and middlings, with a certain amount of green food in the summer, and a moderate amount of ensilage and roots in the winter. What holds good with reference to the quality of butter, which was considered this forenoon, holds equally good with reference to the quality of pork. It is not an increased quantity that we want in these New England States, as much as it is an increase in the quality; and that principle may apply to everything that we have to do with.

Here let me revert for a moment to the question of wool and mutton. I am not a politician, in any sense of the word; and whether we should have tariff or free wool, is a question that I shall not attempt to decide. It seems to me that the wool question is very much more of an agricultural one than it is a political one. When we learn in this country to make mutton our prime product and the wool the by-product, then we shall hear very much less about free wool than at present. The question of tariff does not affect the producer of wool who is able to produce a high class of wool because he has learned to produce a high quality of mutton. The question of a high grade of goods depends entirely upon the intelligence with which the animal is fed.

I do not know what Secretary Gerrish's idea of what the character of my talk on pork products was. I expected that the chairman would have continued a little longer and tell us something more of his own practice. We, at Deerfoot farm, very politely take off our hats to your president in the matter of pig production, for I understand from your secretary that he is able to produce three litters of pigs a year, while we are not able to produce two.

MR. GERRISH: I am sorry to say that the man I had reference to is not with us to-day.

MR. CHEESEMAM: I suppose that I am to speak from the standpoint of the butcher's block, and if I have time, to carry it further—from there into the dining-room. In speaking of this subject I shall have to refer somewhat to the way we manage at the Deerfoot farm.

What I have already said with reference to the quality of meat has an important bearing on our products. We cannot, from the nature of our business, cut up any animal which we select by accident. We have to select such animals as are most suitable for our purposes. We have to exercise the greatest care, and that is why we confine our purchases to the New England States. We purchase every year from Franklin county, Massachusetts, from nine hundred to ten hundred pigs a year. Franklin county, as many of you may be aware, is practically a dairy county. For the last few years we have taken six or eight carloads from the State of Vermont, and we have drawn some from this State. But in every State we have taken special care to select our pigs from those vicinities where dairying predominates, because that is the best guarantee for us that the pigs have been fed a fair proportion of skimmed milk. Our pigs, when cut up, are divided into the ordinary butcher cuts, such as loins and bacon stock, varying from eight to fourteen pounds per pig, according to the size of the animal. Some of the pork must be put up into fifteen or twenty-pound kegs. From some of the pig we make sausages, and we have a limited demand in some of the hotels in New York for the jowls and hams.

During the last six months we have been engaged in a very interesting experiment. This experiment has been with a view of establishing the effect of breed upon the pork product, with skimmed milk and buttermilk as the basis of food. Last spring there were four breeds that were tested—the Berkshire, Poland China, Cheshire, and Tamworth. We were to cut them up and report the relative qualities of the roasts, hams, bacon, and other products. We foresaw, after having some experience in judging of butter, that this would be a delicate task for one man, and so we obtained the privi-

lege of having a dozen or so of ladies and gentlemen of acute taste assist us in determining the qualities of the bacon. We have at present given our decisions in regard to the bacon with this result: I think the Berkshire scored about eight votes; the Tamworth, none; and the Poland China scored only two first votes, and no second votes at all. That trial has been exceedingly instructive to me. The bacon was all treated exactly alike in the matter of curing, salting, smoking, and in every other respect. The Poland China bacon was undoubtedly the coarsest, and the two jurors who pronounced on that bacon must have got extraordinary good cuts. My wife and I voted for the Berkshire as did six others. At the second trial, made at a breakfast given by Mr. Edward Burnett, at which Governor Hoard was present, we all voted on the Berkshire. During this test, these facts came out: The Berkshire, being the fattest of all, was therefore the most delicate, because it absorbed less amount of the salt and smoke; while the Tamworth, being the leanest pig, absorbed the greatest amount of smoke and salt. For this fact I am indebted to Governor Hoard. That would show that the leaner pig could not endure the same amount of smoking and salting as the fatter and less lean pig could. So you see that experimentation of this kind is exceedingly important to the proper curing of our pork products, and also has an important bearing on pig feeding. Such results would tend to modify the practice of the butcher on the one hand, and of the feeder on the other.

Just a word or two in the matter of packages. I suppose there is no feature of the distributing business, or retail business, of the pig products, at the present day, which has received more attention than the matter of packages; and particularly is that the case within the last five years. Only a few days ago this fact was forced upon me by the receipt from New York, of a pressed box, pressed out in the same manner that tin is pressed into small vessels. This was pressed or produced from wood pulp. It was embossed on top, by machinery, with the name

of the packer and description of its contents. This development of taste in the matter of packages has kept pace with the development of skill in feeding for the higher grade of products than we have been accustomed to in the past.

If we wish to make the most progress possible in the raising of the best class of product, it is necessary that we make the most of our opportunities—that we should make the most of the material which we may have at hand; and then we should seek the coöperation that has been described or suggested, as a valuable aid in the sale of butter. Through such a combination of farmers you can find the best markets and sell at the best prices. In this connection let me say, that while going to lunch I was forcibly impressed by the modesty of a man who has received second prize on his butter, here to-day. He told me the price for which he had sold his butter, and asked my advice with reference to the market, and matter of price. I thought it was exceedingly modest in him to send his butter to the market he did, and sell it for the price quoted by him. Here is a man who stands in need of fully appreciating the value of his own product. He has not realized for his product its full value. Those are matters which deserve serious consideration. There should be organization in the sale of farm products. It seems to me that the interest of the farmer lies in coöperation in the selling of his products, not only of butter, but also of the pork products, and thus continuing in the matter of pork what the farmer has been accustomed to do in the matter of butter.

I do not know, ladies and gentlemen, that I can occupy your time any longer with profit. If there are any questions that anyone feels disposed to ask me, I will endeavor to answer them to the best of my ability.

QUESTION: How many pounds of sausage would you get from a hog that would weigh two hundred pounds?

MR. CHEESEMAN: That is a hard question to answer. When the sausage market is brisk, and the demand for hams is relatively moderate, more goes into the sausage. We sometimes cut up hams for sausage, and sometimes the loins

go into sausages. The amount of sausage that we would obtain from a hog is a variable quantity.

Gov. HOARD: How do you require farmers to feed the pigs that you buy of them?

Mr. CHEESEMAM: The only requirement that we are able to enforce is that they shall be dairy fed. We advise and encourage the feeding of middlings and bran, during the early stages of fattening, and sometimes linseed meal. We always advise against feeding corn meal until the pig is — say five or six months old.

Gov. HOARD: Do you believe in feeding bran after that time?

Mr. CHEESEMAM: No, sir, except under some circumstances where they have no milk.

Mr. HUMPHREY: This question of the pig is certainly an important question for the New Hampshire farmer, and for New England, I might say. It strikes me that the farmer who does not keep pigs does not keep the right kind of stock. In my view, one of the great advantages of keeping pigs on a farm is as a manure-making animal. I believe them to be the best manure-making animals there are in existence.

Gov. HOARD: Mr. Chairman, I am very much interested in this topic. I have had some experience, and made some experiments in this line. My son and myself, own and manage two large creameries at Fort Atkinson. One four miles out, and the other in the city. The people had never given as much study to the value of skimmed milk, as they should have done; and there was prevalent among them this notion of the store hog. No doubt a very large proportion, I think it would not be too much to say seventy or eighty per cent, of the hogs killed were wintered over. Well, when we started our creameries we wanted to convince the people of the value of these by-products, and we wanted also to bring them into the understanding of how to feed skimmed milk with the largest degree of profit. That was an essential thing for us, because if they did not make money out of the creamery, we would not. So we instituted a series of exper-

iments which cost us about three hundred dollars, but we, ourselves, derived a very considerable degree of gratifying knowledge from the matter and considered the money well expended. We took hold of these experiments and obtained some very interesting facts connected with animal physiology.

We went into a series of experiments to determine, if possible, at what age the pig will take the largest assimilation of weight for the food consumed. That is one of the most important questions for which we have to find an answer; not only in respect to the growth of pigs but of everything else. We found that there was a rising scale for the pig until he reached—say fifty pounds. Up to fifty pounds there was an increasing ratio of weight to the food consumed; but after he had reached fifty pounds he commenced going down hill, and we got a constantly decreasing ratio of weight to the food consumed. So that when we got a pig weighing 100 pounds, in order to gain one more pound, it costs 10 per cent more than it did at 50 pounds; at 150 pounds it cost 17 per cent more to make a pound of meat than it did at 50; and at 200 pounds it costs 30 per cent more; at 300 pounds, from 30 to 48 per cent more to make one pound of growth than it did at 50, it depending upon the individual characteristics of the animal. It is important for us to know the law that governs this increase of weight. Some of the food that is given the pig seems to be lost as far as the increase of weight is concerned. That is called the food of support. The pig takes his food and at once it produces an effect in two directions. First, so much of it as is necessary is appropriated for the support of the weight already acquired, and whatever is left goes to make up the weight that you want him to acquire. It reminds me of the law that sometimes governs love. It is said that there are some women, if you want to make them love you, you must fill them up with love for themselves, and what flows over belongs to you.

Supposing you have a hog weighing 299 pounds and you say, when he touches 300 I will sell him. Now you have got to feed him enough to support that 299 pounds—hold it right

there—or he will drop back to 298, and then you will have two more pounds instead of one to add. Consequently you will have to support that live weight all the time that you are trying to increase that weight. You have been supporting the original fifty pounds right along, and also the additional weight that you have been adding from day to day; and then you say, I do not see why I cannot make any money. You are supporting more than you are producing; consequently the cost of support has taken away the profit of what you have produced. Now what is that ratio of support is a very interesting question. As near as the experiments could get it, it was about two per cent in food every day, of the live weight, supposing the pig weighed three hundred pounds. Two per cent of three hundred is six. That pig would require six pounds of food every day to support his two hundred and ninety-nine pounds. The pig appropriates that for his daily support and it requires a good deal to make any additional growth. When the pig weighs but one hundred and fifty pounds the ratio of support is smaller. The amount of food for support that you are obliged to feed is smaller in proportion to his weight. Every intelligent feeder of steers sells at twenty months, rather than at forty months; and so an intelligent feeder of pigs will sell at six, eight, or nine months, rather than at fifteen, sixteen, or eighteen months. If you make two pigs weigh four hundred pounds, there is a ratio of profit in them, but if you make one weigh four hundred pounds, there is a ratio of loss.

THE PRESIDENT: I am sure we are under great obligations to Governor Hoard for this practical talk that is right to the point on the pig question. Here is a lesson that we can apply to other things as well as the pig. I think that we have food for reflection here for some time. I will now introduce to you Mr. C. H. Waterhouse, vice-president of the association, who will speak to you upon "Milk Analysis."

MILK ANALYSIS.

BY VICE-PRESIDENT C. H. WATERHOUSE.

Milk is of a complex composition. To the ancient as well as the modern world, it was a fluid of great virtue, and was the first form of food that received the attention of physicians. To it was ascribed valuable medicinal qualities. Ancient physicians prescribed and forbade its use in certain ailments. Only three parts were at first recognized—serum, butter, and curd. In the year 1619, milk sugar was discovered.

Milk was first observed under a microscope in the eighteenth century, and found to be a fluid containing many globules, some of which rose to the surface. In 1737, we find a record of milk testing, a report of which gives about the same amount of solids as now, thirteen per cent. Milk has been tested with a variety of systems and found to curdle with all acids. After boiling with alkali, we find it changed to a brownish color. The rapid determination of the quality of milk is of great importance, and various methods have been introduced for the purpose. There is no question of so much weight to the dairymen of to-day, as the division of profits of coöperative creameries. Unless some method is adopted, the factory system will be on the decline, especially in localities where patrons have been taught that it is for their interest to grade up. Years ago, when creameries were first started, nearly all the cows were natives, consequently, the difference in the quality of milk furnished by patrons was very much less than now, and the division of profits worked less injustice. Pooling of milk puts a bounty on fraud. The factory system must be modified so that it will be for the interest of every man to deliver pure milk from whatever breed. It would be impossible to centre the views of dairymen to one breed of cows, and as the breed and not the feed put in the quality, thus the more we need some system for determining the quality of milk. Jerseys and Guernseys put in five and one half pounds of butter to one hundred pounds of milk; Durhams, Ayrshires, and Holsteins, four pounds to one hun-

dred pounds of milk. Then at twenty-five cents for butter, milk of former breeds would be worth \$1.37 per hundred pounds; of the latter, \$1.00 per hundred pounds. Partly for this reason we find so much dissatisfaction among patrons. The variation in the amount of fat in milk from month to month is surprising. How often we hear men say, "My cows ought to give good milk for I feed an abundance of grain." Experimenters tell us feed does not materially change the per cent of fat in milk. Experiments were made at Cornell University, for several years; report no marked advantage was gained by feeding grains, in per cent of fat in milk.

We not only have milk testing apparatus, but we have machines to determine the per cent of fat in butter. I am asking that butter be sold according to the amount of fat it contains; the standard to be eighty-five per cent, or whatever shall be determined at the experiment station. We hope the House will enact a law to that effect; also create the office of dairy commissioner, whose duty it shall be to visit creameries, stores, and wagons, with power to sample butter, cheese, and milk for analysis, and prosecute any violation. Said commissioner to be appointed by the governor and paid by the State. He should be law and Gospel in creameries as to the tests and amount of water sold in butter, etc.

This is a little off my subject, however, but good suggestions are in order at any time. Milk testing is the great dairy question of to-day, and the interest will increase for some time. The most advanced dairymen see in it a means of helping to find out the poor cows of the herd without the churn test. The factory man sees a means of dividing money with patrons, according to the fat contained in the milk. Watering milk will stop short off when the fat test is used. Even the dishonest dairyman will hardly be willing to draw water to the factory just for the fun of it. If the dairymen are unwilling to use it to divide money, there is still another use for it—in what it teaches in regard to skimming and churning; in fact, all the losses in the dairy. It will assist the dairyman in determining which cow of his herd to send

to the butcher. When a man puts his hand into his pocket and finds his wallet gone, he at once goes in search of it. So with the dairyman. When he discovers a loss he immediately looks for the cause. Dairy men have been searching for a long time for an absolute system of testing milk.

Those of you who were present two years ago, at the annual meeting of the Granite State Dairymen's Association, will remember I advocated a system for testing milk in every town. There are several different kinds of apparatus, all upon the same principle. There are many kinds of mowing machines, but all upon one principle—shears cut. So with milk, any apparatus that will give the per cent of fat with the least expense and in the shortest time, is the most desirable. Some advocate the testing of milk delivered at cheese factories. We have here two systems—Professor Short's, and Dr. Babcock's. One experimenter in speaking of Professor Short's system said, "Of the one thousand samples tested by it and the gravimetric system, the difference was less than one tenth of one per cent." Then let us feel that we have here as good a test as there is. Difficulties have arisen by not having bottles properly graduated; some have been put upon the market without any graduation marks, measurements are made with a little rule. I found one creamery manager using such bottles, and the difference in the size of the bottles would make one per cent. We should be very particular to get good samples. Thoroughly stir the milk and use a dipper, take a little in a tumbler and let the samples remain until all become of the same temperature.

Well, says one, I sell my milk to the cars, what do I care about this? Sure enough what do you care? If I should tell you that you do not get any more for a pound of butter in winter than you do in summer, you would not believe me. This statement is made to those who sell for eighteen cents in summer and twenty-two and one half in winter.

Here is a test sheet from which was made our pay-roll for July, an average of four per cent: In a can of $8\frac{1}{2}$ quarts of milk, which weighs 18 pounds, you will get $\frac{7.2}{100}$ of a pound of butter.

Now here is a test for November, an average of five per cent: In a can of milk you will get $\frac{9.0}{100}$ of a pound of butter.

Instead of $4\frac{1}{2}$ cents a can difference, there would be 7 or 8 cents a can difference in price, on the basis of analysis at the creamery.

Mr. Waterhouse then illustrated the testing of milk by the Babcock tester. Samples brought in by different members of the association were tested by the Babcock system and the results compared with the results where the same samples were tested under the Short system.

Babcock.	Short.	
5.6	5.12	
11.	10.	Guessed at in both as the scales would not register so high.
10.50	10.50	Guessed at.

Other samples were tested but were not compared.

MR. BAKER: Mr. J. G. Tallant's sample tested eleven per cent. We should like to hear from Mr. Tallant, of East Concord.

MR. TALLANT: Ladies and gentlemen, I have always been a great stickler for breed. This milk came from the Jersey cow, Little Mischief. She is now six years old and she has not been dry since she dropped her first calf. I have noticed that as the time drew near for her to calve, what milk she gave was very rich—that is, I thought it was as compared with other individual cows in the herd. She is now due to calve in about six weeks.

I was not aware that there was to be anything of this kind here, but I took samples of three different cows' milk and thought I would bring them down and show the richness. Those bottles of milk were placed in hot water as I thought it would throw up the cream better. When they were brought down here this morning, it was discovered that they were going to have this testing apparatus here so this sample was put in.

QUESTION: How much milk does that cow give?

MR. TALLANT: She is giving now two or three quarts a day.

MR. BAKER: Ten and five tenths per cent. That sample was brought in by me and I suppose that I have to do the same as Mr. Tallant has done. I am not such a stickler for breed, perhaps, as Mr. Tallant is. The cow from which this sample is taken is a cross between the Holstein and Jersey. She calved the seventeenth of last July and she is now giving between seven and ten quarts of milk a day. She made last year four hundred pounds of butter.

QUESTION: How many pounds of milk did she give to make the four hundred pounds of butter?

MR. BAKER: I cannot tell. I weighed the milk but I have not the data with me. I cannot give the figures here.

Another sample that I brought has tested 5.4 per cent. That was a sample from another cow. She was a grade.

QUESTION: What grade was she?

MR. BAKER: Perhaps I might answer that question by saying that she was one fourth Jersey, one fourth Holstein and the other half cow. There was some Jersey and some Holstein blood in her.

MR. GERRISH: I would like to ask the governor a question. Whether he considers anything a grade that has not a thoroughbred sire?

GOV. HOARD: It is proportionately a grade.

MR. GERRISH: I have sometimes refused to go into the grade class because I have not used a thoroughbred sire with my sheep for about twelve years.

GOV. HOARD: I do not think it is a profitable way to grade. I think that a person should use a thoroughbred on one side or the other.

MR. BAKER: In three of the samples brought in by Mr. Connor there is very little variation. They run 5.6, 5.6, and 5.1 per cent. He also brought a sample which tested 8.2 per cent.

MR. CONNOR: The sample that tested eight per cent and a little over, I imagine is from a Guernsey that has been in milk

over a year — a year and a half, perhaps. She is giving about six quarts of milk a day. I regard her as one of my best cows.

MR. CHEESEMAN: Is she in calf?

MR. CONNOR: No, she is not. One of the other three samples is a sample of the average herd. I took a certain portion of the milk of each cow in the herd and stirred it up and got my sample from that. The other two samples are from two cows, one of which calved two months ago and the other four or five months ago. They represent about the average herd, it seems.

GOV. HOARD: This sample work is a good thing, and I believe that the use of these tests is going to have great practical results. In our creamery we took twelve thousand tests last year. We are constantly at it. We test our skimmed milk and butter milk, and we are constantly proving our work to know if the machinery is working properly or whether we are losing butter.

Then this butter is owned by our patrons, and we want to divide that butter upon a test basis to those men. We have a novel way of getting at it. We are all pooling our milk. So we have what we call a Jersey vat, a vat into which is put all the milk from cows that have fifty per cent of Jersey and Guernsey blood. I have discovered that breed has a good deal to do with the butter fat that is in the milk, and we also have other vats in which we put all the other milk in that same way. So we try to have every kind of milk pooled together according to the amount of butter fat in it. Consequently, those men that have the poor cows are getting distanced. When they were getting their profits out of their neighbors they were the most contented lot of fellows I ever saw. This little test business is the thing that is opening men's eyes.

We take four per cent of fat and establish that as a basis for the standard test. To the man that brings milk that has only three per cent of fat in it we say, you shall not have a dividend equal to four per cent. On the other hand we try to see that justice is done the man that brings milk with more than

four per cent of fat in it. So we are trying to do this business on business principles, and this little test is helping us out.

I want to give you a couple of illustrations of these patrons of ours. At the head of the list stands a man by the name of McPherson, to whom last year I paid sixty-five dollars a head for the products of his herd. At the foot of the list is another man whose name I need not give, to whom I paid thirty-five dollars a head for the earnings of his herd of twenty cows. The same sky above him, the same earth beneath his feet, the same market in front of him, and the same creamery behind him. It beat everything how this thirty-five dollar man was cursing the tariff and everything else. He was out of sorts with everything. The first man has a herd of cows which are Jerseys, I think. This herd gives, upon an average, about six thousand pounds of milk apiece while the other man gets about three thousand. He says that a cow is a cow, and it don't make much difference where you get her or where she comes from—she is a cow. We can do but very little with that man. We paid him thirty-five dollars for each cow. What did it cost him. It cost that man thirty dollars a head to keep his cows. It is impossible to keep a cow as we keep them in Wisconsin short of thirty dollars apiece. That gave him a margin of five dollars for his labor. Mr. McPherson's cows give him a margin of thirty-five dollars. One man gets seven hundred per cent more than the other. It is just that little difference between the man of brains, the man who is an honor to the name of dairyman, and this other man who represents the average man, or below the average man. I heard Mr. McPherson utter an important truth which every dairyman in the country can take to himself. He said, "I will be blamed if I will be an average man. There isn't any money in being an average man." Put it right there in everything. Never be an average man. You will often hear men say, I want to know how much it is worth on the average. The whole glory or satisfaction in life is to be more than an average man, more than an average dairy-

man, having more than an average cow, and being thorough in everything. At the same time you get pay for being above the average.

MR. CHEESEMAM: I want to say one word, Mr. President, with reference to this apparatus for testing milk. We have tested it right along with the gravimetric system, and I can pay it a very high compliment.

Something was said this morning by Mr. Philbrick about employing too cheap help. When the governor visited us about two months ago, he said that he paid his head man twelve hundred dollars a year. I do not know of any creamery in the New England States, running either on the proprietary or coöperative method, that pays as high a salary as that. Some of them pay a thousand a year.

GOV. HOARD: He is worth it because he has brains, knowledge, and skill. We keep a man to run the separators only, and find that it pays to do that. I want to add another word in regard to this question of skill. Take the average farmer, and it does not often occur to him that his financial salvation depends upon how much skill he sells. It is just as true with him as with that man in the factory, it is the skill that commands the large price. I was coming down a river once on the north shore of Lake Superior. I was in a bark canoe with a couple of Indians. We ran down the river at the rate of twenty-eight miles an hour, dashing down some of the most terrible rapids you ever saw. Coming down one of these I looked ahead, and there was a great rock that loomed up before us. I knew that I was gone. The canoe would surely strike that rock and there was no chance for life in that boiling, surging current. The birch bark canoe seemed to rush right on to the rock, when, just as it struck the reflex action of the water against the rock, the Indians took advantage of that, turned the canoe, and we passed by, but it seemed to me a hairbreadth escape. This experience was repeated constantly for twenty-five or thirty miles. What was there between me and death? It was not the thickness of the canoe, for it was but a thin shell; it was not muscle, but it

was skill. It seems to me that if we could only get our agricultural population, our dairy farmers, to realize that it is the skillful labor that is the most remunerative and the most in demand, we would make a great advance.

Within the last ten years a large amount of intellect has been expended right on this problem of making butter and of breeding cattle. We are trying to eliminate this fog that has surrounded us for so long, and wherein we have worked for generation after generation to so little purpose. Perhaps the farmer has the right to complain that he gets so little for his labor; but I do believe, that if we would turn his attention towards himself rather than towards the stars, there would be a greater advance in our methods and our results.

EVENING SESSION.

The meeting was opened by the president, and Ex-Governor Hoard of Fort Atkinson, Wis., was introduced by Governor Tuttle as follows:

The gathering here this evening shows an increased interest in that which concerns the industries of our State so much. I congratulate you, gentlemen and ladies, in securing the services of the honorable gentleman who will speak to you this evening, and I am pleased to introduce to you Ex-Governor Hoard of Wisconsin.

DAIRY TEMPERAMENT OF THE COW.

(ILLUSTRATED.)

EX-GOVERNOR W. D. HOARD, OF WISCONSIN.

Ladies and Gentlemen,—I need not say to you that it affords me great satisfaction to be the bearer of a message to you somewhat different in character from those with which I have had officially to deal for the past two years. I am out of my jurisdiction, as far as my official relations are concerned; thanks to the universality of the cow, not out of her jurisdiction.

I am to talk to you to-night upon a question, which, in my

judgment, is one of the most important affecting our understanding of dairying. The proverb says, "As a man thinketh so is he." I have been very much dissatisfied with the standards of thinking concerning the dairy cow. The dairy interest of the United States has been tentative to a very large extent, has been struggling alone to its present shape. I understand that man's wrong judgment of the animal upon which the dairy interest is dependent, has been very largely the reason of the lack of success, and these judgments have been very much the creatures of notions and not of the understanding. The average farmer of the United States must, in the nature of things, become the breeder of the dairy cow. Yet but a very few men, to-day, are scientifically engaged in the production of dairy cattle. Success and prosperity to our people is gauged by the knowledge of what the average farmer knows of this animal which is so important to his welfare. As a consequence, it seems to me that there ought to be a decided, earnest, and conscientious study devoted to the interests of this animal.

If you have noticed, you will find that almost every other breeder of our domestic animals is clear and clean cut in his understanding. The horse man shows clear and clean cut ideas and understanding as to the horse; the man who breeds dogs has clear and clean cut ideas as to the dog; the man who breeds chickens has clear and clean cut ideas as to the chicken; and the man who breeds sheep, the same as to the sheep. It would be a ridiculous proposition to make to the merino-sheep man in the State of Vermont or New Hampshire, to say to him that for the sake of improving the fineness of the wool he ought to cross that merino with the Cotswold; or to the trotting-horse man, in order to improve the speed and trotting qualities of his Hambletonian he ought to cross it with the English Shire or Clydesdale; and so the game-chicken man would look at you with unfeigned astonishment, if you should suggest to him that to improve the fighting and staying qualities of his game chicken he had better cross him with the white Brahma. So you see that in every thing con-

cerning all of our domestic animals except this animal, the cow, the average man has a specific manner of breeding and handling which follows in the line of their judgments; but the moment you come to the dairy cow, that very moment everybody is mixed in his notions. That is why I have so often found myself diametrically opposed to the general idea.

I would say that I have been engaged in the study of this question for over thirty years; have been quietly and patiently at work striving to build up a judgment and discernment that should be just and true to the facts in the case and the physiological law that underlies this animal.

I find that there is just as specifically a dairy temperament in cattle as a speed temperament in horses, a fighting temperament in chickens, or a scent temperament in dogs, which may be made or considerably altered by some of these outside ideas. Let us start to-night, my friends, from what is known as the dairy temperament. The question may be asked, what is the dairy temperament? What is meant by it? All men and all animals are temperamentally constructed. Your speaker stands before you, for instance, known physiologically as a man of a nervous, bilious temperament. Another man may be known as being of a phlegmatic temperament, and another of a specifically nervous temperament. Now this distinction of temperament creates a distinction of form, and form creates a distinction of function. This is a very interesting physiological fact, yet your own observation will show you that it is true. Show me anywhere a man who is engaged in decidedly nervous work, work which is calling constantly upon the nervous machinery and not upon the muscular, and I will show you a man who has a corresponding constitution of body and form. Temperament decides the peculiar work we shall engage in. For instance, did you ever see in your life a very deft and swift seamstress, one expert with her needle, who had a very short, thick, puggy finger, and a short, thick neck? No, or rarely ever. It is almost universally the lean, nervous-built, quick-motioned woman, with thin fingers, deft in her touch. She belongs to

a temperament that decides her avocations and her functions. Did you ever in your life see a man who was a skillful violin player, who had such short, thick-built fingers? If you did, you have seen a man playing at it, but you never saw a man with such fingers who was master of the art. I have studied hundreds, and I might say thousands, of such men, and I have seen universally that the avocations and functions follow the temperament of men. This is just a little talk upon the effect of temperament in deciding the avocation or function. Let me say that it also establishes form. Now intelligent horsemen study the form of the horse, because they know that the form of the horse determines function very largely, and function determines form — both are active and retro-active in their effect. For instance, the shoulder of the trotting horse pitches back in this way, which is for the purpose of allowing the forward legs an easy and free motion out in this way. The draught horse has a shoulder more nearly vertical, in order that the collar may form a larger and more close compact with the shoulder, and a loss in the freedom of motion results. The trotting horse has a more raised spine. Turn it right over, and there is the draught horse spine. The shape of the spine of the trotting horse gives the hind portion more spring, and brings about the perfectness of its motion. The whole is mechanical in its action. Now there was an old Arabian, two thousand years ago, who said, "Form is everything to purpose." And yet, I find plenty of men to-day that pay but little attention to it. Form, I have said, was everything to purpose. It is so in the mechanical world. The action of the horse is a mechanical motion, and the action of a cow is mechanical. She is a machine. A sewing machine is made different from a spinning machine, and a mowing machine from a threshing machine, and so everything is varied along the line of function.

This is a question of temperament with the dairy cow. The dairy quality is based upon what is known as the nervous temperament. Let me say here that, specifically, speed in horses, scent in dogs, and dairy qualities in cows are practi-

cally based upon the nervous temperament, and there is no animal in any one of these three classes that shows decided nerve and ability in the exercise of its particular function, but what draws more upon the nervous temperament than any other.

Now we are engaged in a study to find out some reasons, if possible some causes, that make this animal what she is; and our practical purpose is to use what conclusions we may arrive at in the practical work of her production, her breeding, her handling, and her feeding.

Breeding is based upon heredity. Of all other men on earth, the breeder is, in the best sense, God's vicegerent here on earth. He is the one to whom vicegerency is conveyed and to whom is given the foresight, authority, and power to shape life to the common good. As a god, knowing good from evil, he is dealing with the most profound of mysteries, that of life. This power I have said is based on heredity. It is by the establishment of this principle that power and purpose may be transmitted to posterity. There arises at once in that view of the question, the idea of potency. The thoroughbred animal is potent, while the unthoroughbred is largely non-potent in the conveying of this power. Let me illustrate what I mean by this potency by calling to mind two streams. Here is a stream that comes down by the border of Wisconsin and the States of Illinois and Iowa. It is a beautiful clear stream, taking almost a southerly direction. It is the Mississippi. But away from the northwest comes the Missouri, turbulent and muddy, but powerful in its current. It strikes the clear waters of the Mississippi almost at right angles, and thence the "Father of Waters" flows contaminated to the Gulf of Mexico. That fitly illustrates the question of potency as we find it in breeding. Here is a thoroughbred current that comes down through a long series of years and is stored full of potency unbroken in its reinforcements, it may be for a hundred years, a thousand years. Those cattle in Holland have been bred for a thousand years for a purpose. Here comes that current, and here comes

another current that has been kept pure throughout, kept in line with its purposes. It mixes with the other current, and by its force and potency, establishes itself from that time on. In humans this principle is seen only in one race clearly, and that is the Jew. He has maintained a pure and unbroken line of blood. He is the most wonderful inbred animal there is to-day on earth, inbred to that extent by the means of relating lines of blood being thrown together, and that produces intensity of type. Inbreeding is safe, providing it is used with understanding and care, if used with a knowledge of what it will do. But many men that have never studied it have a prejudice against it. Let me say to you that every type of dogs, cattle, or horses to-day has been made so by the intensifying power of inbreeding. The Jew, as I have already said, is the most powerful inbred animal on earth. Let his current of life unite even with that of the negro and the product is a Jew all over. Let me show you a fact to illustrate to you how the principle of relating currents of life was used. Moses was the son of his father's aunt. Commence at the foundation stock. We have Abraham, Isaac, Jacob, Levi, Kobath, Amram, and Amram is the father. Start back on the mother's side, and we have Abraham, Isaac, Jacob, Levi, Jochebed, and Jochebed is the mother, the daughter of Levi, while Amram, the father, was the grandson of Levi. I am not here to discuss the moral side of this question. You can take care of that. I will trust any New Hampshire man to handle the moral side of anything. I am busy with the physiological fact that this line of management, the same that is used to-day in the production of these wonderful animals, has produced the most intense and powerful type of humanity known to-day among men. Inbreeding equals intensifying. But I do not wish to be misunderstood. Inbreeding is like a razor. It will cut your throat or cut your beard with equal willingness, depending upon how you hold it. I allude to this question to show you the possibilities of breeding upon heredities. Take the type of heredity as shown in dogs. Take, for instance, the fox hound. I have

bred both the fox hound and the setter dog. The fox hound has a sharp nose with a most marvelous filamentary sense, whereby he distinguishes the scent of an animal. I have known him to take a track twenty-four hours old and follow it, when it seemed as if there were no earthly means whereby he could tell the story. He has been bred in a line during eight hundred or a thousand years, for a certain specific purpose. He has been bred for the one single purpose of tracking the fox. He will cross a hundred bird tracks, while ranging over the field, and he will never know it. It is on account of no lack of scent, but it is because he has been bred for another purpose. But the moment he comes to the track of a fox, he will lift up his head, and say in his own fashion, "Eureka, Eureka, I have found it!" Found what, Mr. Fox-hound? That for which I was bred — a fox track. On the other hand, you will see the bird dog, whose nose is just as sharp and whose scent is just as keen, range across a hundred fox or rabbit tracks, and pay no attention to them. He knows nothing of it. The powerful effect of his heredity is at work in him, holding him to his purpose. But the moment he touches the track of the prairie chicken or quail, or anything of that character, that very moment you will see him stiffen suddenly right in his tracks. What is the reason of that? The thousand years of breeding is answered in that posture. Do you know of a boy in New Hampshire who would be foolish enough to go out to hunt foxes with a bird dog, or birds with a fox hound, or for either with a bull dog? No, you cannot find them. But, unfortunately, his daddy may be found hunting for butter with a beef animal, forgetting that this distinct line of heredity is just as distinct for his purpose as it is for the hunter in the field with his dog. It is our duty, I think, as intelligent men, to pay attention to the lines of specific purpose and get specific benefit. The mystery is, that the dairymen of New Hampshire, of Wisconsin, and of the United States everywhere, have been raising the constant cry,—We want a cow for general purpose. General purpose! It is almost as destructive to the prosperity of the farm as

general disability was to the army during the war. If you, as dairymen, have a cow good for general purposes, I would advise you to kill, sell, or give her away. To-day, with the sharp competition that we have to meet, we must have animals of a specific purpose, and those men who are taking that position are "wise unto their own salvation."

Now I wish you to note these three breeds (pointing to the chart). These are three dairy cows. Here is the Guernsey cow, "Select," a type of her class, one of the Channel Island cattle, distinctly bred for nearly two hundred years for the depositing of butter fat in her milk. A clear, distinct purpose has marked these simple islanders, and they have kept her blood pure. Here is the Holstein cow, "Tritomia," a type of her class. They are bred in Holland. Here is the Jersey cow, "Matilda, 4th," which in one year made her weight in butter. Here is a Hereford, a type of her class. You will see in those three dairy cattle a wonderful agreement in outline, shape, and construction, all three agreeing very closely in the character of their outline and build. They belong to the dairy temperament distinctly. That cow and this (indicating the Jersey and the Guernsey) belong to the butter division of the dairy temperament. There are two divisions of the dairy temperament. That cow and this belong to the butter division of the dairy temperament; and this cow (the Holstein) belongs more especially to the milk division of the dairy temperament as a breed. Yet this particular individual is a fine butter cow. This cow (the Hereford) has a beef temperament in her blood. Let me say to you that the judgment of many as to what constitutes a good dairy cow has been badly corrupted. You will often hear a man say, "I want a dairy cow straight on the back." No good dairy cow should be built straight on the back. It is a beef line and for beef purposes only. You note this cow (the Hereford). You see her heavy thick neck, her broad projecting bosom or brisket, her heavy shoulder, straight back, and heavy loin. You see the level hip. You see the deep flank running down here. You see all of these outward

indications that, in accordance with her purpose, nature has established a temperament here and has lived up to it. But there is no dairy in that cow; there is no milk in her. Indeed, many of them have so little that they are hardly able to support their young. This temperament can be carried so far, my friends, as to interfere with the powers of maternity. Now this cow (the Hereford) is a miser. The beef temperament is miserly in its make-up. She stores up whatever food you give her, and gives you nothing in return, until she is laid upon the butcher's block. She is an artificial creature, like these others, for the modern cattle are all artificial, and they all have a temperament adapted to a certain purpose, unless it is the Texas cattle. The Texas cow does not belong to the dairy temperament, nor to the beef temperament. I do not know to what temperament she does belong, unless it is to the speed temperament. I remember of being chased miles by two hundred of them. I was well mounted on my good horse, and led the most remarkable charge that was made in Texas, at least, during the war; and if a man is to be judged by his following, I was as popular a man as was ever seen in Texas.

The different temperaments are to be studied from totally different standpoints. These animals (the dairy) are to be handled from totally different standpoints from that (the Hereford). The theory of handling is different, the theory of feeding is different, and the theory of breeding is different. Consequently we start from temperament, and travel divers roads. It is our business to learn the physiological laws that govern the one, if we are to deal with that class, or the physiological laws that govern the other, if we are to deal with that class.

Now the dairy temperament is essentially based upon the nervous temperament. You see how this animal (the Hereford) looks. She belongs to the phlegmatic temperament. This cow (indicating) belongs to the nervous temperament. This cow is a mother, that a miser. This cow takes food and gives off nearly all of her energy every day. She is based

upon the essentially nervous temperament, an indication of which you see here in the peculiar outline of her head. And note the pose of her head. The race-horse expression is in her; the draught-horse expression is in that one over there. This cow is a mother upon the largest exercise of maternity known on earth. She belongs to her young. Maternity is her cry. Maternity, maternity, from morn to night, and you, as wise men, make merchandise of her maternity, and if you are wise, you make wise merchandise of it, you handle, feed, and breed for the enhancement and enlargement of her maternal powers. All that is based, not upon the muscular and osseous, but upon the power and strength of her nervous system. Let me show to you how conclusively that is true. Take the reflex action of the disease, milk-fever, the same as what is known in the human mother as puerperal fever. What channel does that fever follow? Here is the mammary gland, the most wonderful piece of machinery I have ever studied. Look at it. Lay it under the microscope and examine it. Here is enacted that wonderful mystery, the production of milk, which, like the blood—because milk is produced from the blood—contains the mystery of life. This wonderful organization is surrounded by a network of nerves, called the sympathetic plexus, which run from here to the uterus, from the uterus to the lumbar region of the spine, and then from the spine to the brain. There is a chill, some disturbance or derangement, when the whole system is drawn clear out in its maternal functions—a draught of cold weather or something—something has been done by which the disease starts here in the uterus, attacks these nerves and the telegram immediately goes to the udder, and also to the brain, and the cow acts as though some danger were pending, she knows not what. It follows the sympathetic plexus, proceeding right along this channel of nervous communication with the spine, and immediately paralysis of the hind parts ensues, and what in England is called “dropping” follows. The disease keeps on involving more and more, until finally, she brings her head around to her side and dies, the

victim of her maternity, and, in thousands of instances, of man's inhumanity and stupidity. The great trouble with hundreds of us is, that we never have studied motherhood, and we never have studied the meaning of maternity. I never address an audience and look into the faces of the mothers in it, but what I feel myself understood. But I too often look into the faces of men who have never given it a moment's thought. It is only when we have reached a broader understanding of God's creatures, and our relations thereto, that we will ever know something of the laws that govern and underlie this work.

In the selection of the dairy cow, let me state here, the first thing that a man should look at is the head. The first thing should be a good nostril. The dairy cow obtains the milk from her blood, and she obtains the pure blood largely from the action of her lungs. She must be a large breather; she must have the machinery to meet that demand, and therefore she must have a good nostril; also a wide muzzle and a strong muscular jaw. She is a large consumer of food, and therefore she must be built in harmony with that condition. The muscular jaw must furnish the power to grind the food. Above everything else, look for a large, full, bright eye. That is always found in connection with good nervous power. The fulness of that eye makes a dish in the face. That is not caused by a depression of the jaw bone, but by the fullness of the eye. A good cow should have good length from the eye to the horn. That indicates somewhat the size of the brain, for here is where the great nervous energy starts, and the cow, you know, is constantly making drafts on her nervous strength. The cow that makes a pound of butter a day, in making that together with the caseine which is almost pure proteine, is making a more severe draft on her nervous forces than the horse that helps to plow two acres a day. So, naturally, you find her slow of motion, inclined to rest, desirous of warmth, never engaged in a very strenuous effort for exercise unless you compel her to range for her food, and then she takes it out of you by not giving you back as much milk.

We should provide these benefactors with all the comforts possible and not compel them to range in the way I have lately seen them between here and my native State. This is a matter of motherhood entirely. The rules of maternity are all in her as in any other mother, and so we want the region of the brain strong and full. I judge a cow from physical points and I want a reason to underlie every idea. The reason for that is that I want to see this nervous action very full and strong. For the same reason, I want a cow to show a long tail and that the end of the spinal column should reach beyond her, for we want the spinous process long and full. The next thing is the backbone. Here the same law of nervous temperament comes in. This is the channel of nervous connection between with the brain. It is a great battery along down here, from which branch out in various directions the ganglia with grey matter just like the spine. It is a good sign to see a cow with a strong back and large processes of the bones, as these processes are indicative of strength of the spinal formation. When Professor Roberts, of Canada, heard me make this assertion, he said, "I could not see any reason why you placed so much stress upon the backbone, and consequently I felt as though it was empirical somewhat, but when I went to Denmark to pursue physiological studies there, I was forcibly struck with the large size of the spinal processes." He asked me afterwards, "Had you made a special study of it?" I said, "I have followed many a noble cow to the butcher's block." I had followed her characteristics clear through to the last study that I could make of her.

The dairy cow should show a sharp shoulder, because that is in conformity with the nervous temperament and its build. The low mutton shoulder indicates a predominance of the beef temperament, but the sharp shoulder is a quality of the dairy cow. You will see that in this cow the shoulder rises half an inch. Let me tell you a story of this cow. She was owned by a man in Iowa City, and she was one of forty-eight cows that I was called upon to judge at the Minnesota State Fair. When I came to this cow I was struck by her power,

and said to myself, that is the ideal cow. At that fair forty-eight of the finest cows in Minnesota and Iowa were brought together. I gave her the first premium, and I found at once that there was considerable kicking about it. They asked me, "Why did you give that bony cow the first premium? She is not handsome at all." I said, "Gentlemen, I am not here to bandy words. This cow is in the dairy test, and the result of that test will be declared two days from now. If you will be patient I will base my judgment of this case on the way she comes out of that test." Well, we waited, and, fortunately for me, she walked away with the first premium, having made the most butter in twenty-four hours. Then the men came to me, and asked me what I saw in the cow that led me to award the prize as I did. I explained to them that I judged the cow on this theory that I have just been giving you. Look at this cow. See the relaxed build which indicates maternity in the extreme. See the spinal column which rises bold and full. I have given you the reason for wanting that. It is because I want an indication of large nervous force in the cow, because she is called upon for the exercise of her nervous forces. Milk is full of nervous power, and you get it from nerve supporting food. The cow consumes largely albuminoids, and albuminoids are of the nerve supporting foods, and the combined effects of these two things produce a food which is the most nerve supporting food on earth—that is, milk. A celebrated physician in Montreal told me that there was no treatment, after any kind of nervous depression, that was better than the giving of rich milk, and he said, "I am wonderfully struck with the effect of it upon the nervous system. In this cow (the Holstein) here is the relaxed expression of the form, and especially you will notice how the hollows here are shown, you will notice also the light, thin chine at the loins; you will notice here that there is a relaxed expression of the body. Let me say that maternity cannot be carried on so successfully with any such compact and close build as that of the Hereford here.

We come now to the pelvic arch. Here are three famous

cows of three breeds. See this rise here. Where is your straight back? Where is this line that has come to us from the short-horn? This Holstein is individually a first-class dairy cow. Look at the form and shape of this animal. Here is the pelvic arch. See how it rises. What is that for? The effect of it is to enable her to carry on the offices of motherhood more perfectly. You see the insloping ham. The other shows a projecting ham. If it were possible to put your hand down here by the hips, you would find the muscles lying together like my two hands. If you run your hand down here, in the good dairy cow, you could almost thrust your fingers in between these two muscles to the depth of half an inch. These muscles lie apart, and not in a close condition like that of the further cow (the Hereford). The physical condition and make-up show the function of the cow. It is a wise man who studies these distinctions and understands what they mean.

Here is another muscular expression of a good cow, called by some the udder gland, and by some the milk gland, but it is not a gland at all, and has nothing to do with the milk function of a cow, except that it is generally seen in connection with good cows. It is something like a pencil. Put your hand over it, and you will feel it roll from under your fingers like a pencil. It is sharp, clear, and distinct, and it indicates a favoring condition of the muscular system; it shows that the cow is in accord with her temperament.

Here is the great mammary gland. We should consider the construction of the udder as a part of her machinery. A good udder should rise well behind and project well forward upon the abdomen. Lay a line like that right across. A good judge of the cow watches that with a good deal of interest. You have there the line of absorption. The length of that line will indicate to you the power of the udder over the cow, and the shortness of it the power of the cow over the udder. I want the udder, as a rule, to compel the cow to carry on this work of secretion.

I want to speak a moment upon the question of constitu-

tion. You will hear a great many men say, "I want a hardy cow, one that is tough." If she was as hardy and tough a cow as I ever saw, he could not sell her to me. I do not want a tough cow, but a cow of good constitution. A good constitution is necessary in every line of human or animal effort. But what is constitution? It is vitality and endurance in the performance of specific work. It is not necessarily strength. John L. Sullivan is a man of tremendous strength, and he can stand up and give and take blows that you or I could not stand up against, and yet if you should put John L. Sullivan at an accountant's desk or compel him to do the work of a bank clerk, the bank clerk would kill John L. Sullivan as surely as Sullivan could kill the bank clerk in a fight. The constitution of the bank clerk is just as strong as that of the prize-fighter. You have to keep within the measure of each man's functions. Every cow should have a strong constitution, but it should be in the work of a cow and not in making up for your neglect and their exposure. A man who wants a cow that will range the hills of New Hampshire from nine o'clock in the morning until four in the afternoon in the snow, will need a cow that is tough. I have seen them this very winter in New York State, ranging about in the snow with the thermometer below zero, and it is no wonder that the owners of those cows wanted hardy ones. A good constitution in a man or cow is the ability and strength to perform the duties within one's functions. The functions of motherhood invariably demand warmth, and the man that takes that mother and handles her with the idea that she is a bullock does not understand the functions of motherhood. Constitution is just as essential to have in this mother to enable her to fulfill her duties as it is in the race-horse. The best sign of a good constitution I ever knew is the development of the umbilical cord or the navel. A good development of the muscles around the umbilical point is the best and clearest sign of a good constitution, of ability and power to endure in its specific line of work. A good vitality and constitution is not the sign of talent, but it is a sign of endurance in the work allotted to

the animal. The cow that gives you two pounds of butter per day is taxing her machinery and she must have constitution and vitality to endure it. I have given you a sign of that constitution. It is difficult for me to explain it, but I will try to do so the best I can to a mixed audience. The first I knew of this was when I was an assistant to a surgeon in examining recruits for our army. I saw him throw out what seemed to be healthy and splendidly built men. I asked him why this was. He said, "The man has no constitution, no vitality. He will go down under exposure. He will go down under hardship." I said that I should think he had every indication of a strong constitution, and he replied, "Strength is not an indication of a strong constitution. Size is not an indication of it. You have been in the army long enough to know that you have seen a small man marching by the side of a large man, and the large man would go down while the small man would go on." "Constitution is something," says the doctor, "that you cannot feed into a man or train into him. It is that which must be born in him. It is that which his mother gives to him, and this is an indication of it. Here is the very channel through which the mother supports her young. If that channel is large and full and strong the indication is good that the conveying forces of vitality have been of like character. But if it is weak and is not indicative of muscular force, you may look for a weak constitution. No matter what the talent of a person may be, if there is sign of weakness here, he will be pretty apt to go down under a hard strain." I asked, "Doctor, have you ever carried this further than into human beings?" He replied, "I have carried it into horses, and find it precisely the same." I have carried this principle into the study of dogs and cattle. I have repeatedly proved it in the selection of the fox hound who will run all day and never tire. Now then, when you select a cow, you want to look carefully for this sign of a good constitution. It is not a sign of ability, but of power to endure the work. If you judge from this, you will have to study every animal according to its own make-up. The man, the

dog, the cow, and all other classes of animals will have to be studied from their own standpoint.

I want to speak for a moment upon the question of our handling of these animals. We must breed the dairy cow from a dairy cow standpoint, according to the purposes we wish to use her for. There are four good breeds of dairy cattle which have been bred specifically for dairy purposes: they are the Ayrshire, Jersey, Guernsey, and Holstein. Let me give you an illustration of intelligent handling: The women of Holland have always cared for the cattle of Holland, and hence we get the high character of the cattle of Holland for which they are noted. It has been one mother caring for another. I know of twenty-five or thirty women in the United States who have entered into the business of breeding dairy cattle, and there has not been a failure among them. It is because they know what a mother demands that makes them so successful. Take this question of warmth—why cannot men realize that that is necessary for the mother cow. If some men in this land would consult their wives more, they would tell some things that the men ought to know. My wife, a mother that I could question, taught me more than I could learn in this world besides of the laws of motherhood, for the sake of this mother that I could not question. I tell you that this universal law of motherhood, that applies to all God's creatures, is a law that we should study if we would understand the dairy cow. I think I was the first man that brought out distinctly the idea of warm water for dairy cattle. That was twenty-five years ago. I was riding with my wife one day and she took a sudden chill. She was delicate at the time. She said, "I am so sorry I have taken this chill." I enquired of her, "why?" "Because," she said, "it will be worse for the baby." Then I began to ask her question after question. "What will you do?" She told me what she would do. The first thing was to restore her power as a mother by the use of warmth and warm drinks. You will find that every woman in the land knows about that, but not a man ever thought of it. So I

learned this law of motherhood and I commenced to experiment.

Now, my friends, we have obtained the dairy cow by means of the understanding of the dairy functions and those of maternity. We must breed them from the same standpoint; breed for a specific purpose—as the race-horse man, the game-chicken man, or the dog man, breeds for a specific purpose—and then we shall have cattle which will answer our purposes and bring us a profit. But a word of warning. Just as you enhance these functions so do you enhance the likelihood of certain diseases. Remember, my friends, it is never a poor cow that dies with milk fever. “Death loves a shining mark.”

I lost a beautiful Jersey cow last spring, one which I greatly prized. I knew she was somewhat deficient in constitution, but I always cared for her. When I went about my political business, left my gentle friend and went to dealing with political bullocks, it was the worse for me. Word came to me that my bonny Bell had calved, and I started for home. I had always been accustomed to put my cows into a stall a week before they calved, and to keep them there and care for them. I had told my son how to care for her, but he had notions of his own. She calved in the morning and they let her lie out all night. When I got home I learned that the cow was down in the lot with the calf. I said to my son, “You know better than that.” He answered, “You are so fanatical; you are so full of notions.” “Yes, but I never lost a cow with milk fever, my son. I have always been able to prevent it, but never could cure it.” I went down into the lot and there was the little cow, and there was a beautiful calf at her side. I saw at once that she was going to die with milk fever. The calf was taken a little distance from her, and she went around and around looking for her calf. She was already smitten with the blindness that comes from milk fever. She could not see twenty feet away.

Now it is necessary for you to select your cattle for specific purposes, from a specific standpoint, and also to breed from a

specific standpoint. You must always handle them with a knowledge of their functions, and give them the treatment that they demand. There is not a man among you that would treat a human mother except with the greatest care, and you should not allow yourselves to treat this bovine mother with other than the greatest care.

THE PRESIDENT: I think that you will all agree with me that the talk that we have heard this evening will be highly beneficial to the dairymen of New Hampshire, and to farmers in general. It will also be seen that the Dairymen's Association is spending its money well by employing such men to speak to us. I see men here representing different parts of the State, and I am sure they will carry home with them the belief that the money which was expended in bringing this gentleman here, is well spent and will redound to the good of the farmers of New Hampshire. If there are any questions that any of you would like to ask, I am sure Governor Hoard would be pleased to answer them.

MR. TENNEY: Speaking of warm water for cows. What is the cheapest and best method that you know of?

GOV. HOARD: There are so many ways. Since the idea has become prevalent a variety of inventions have sprung into use. One of the simplest ways that I know of is called the Stowell heater, which is a galvanized iron tube in a tank. That heater takes about five cents worth of soft coal to warm the water for fifty cows.

Let me say here that the effect of warm water is best seen when the cows are not so closely housed. You want to take care of your cattle. It is wrong to give cattle ice-water. Remember that flowing water in a cold time is ice-water. If you do not believe it take a thermometer and go out and test it. Forcing a cow to take a drink of that water is not profitable, and I assure you that those who are making a profit of dairying do not do business in that way. They are husbanding the resources of their cattle as they would husband their own. They are not wasting their efforts in that way; nor are they trying to warm barnyards with the warmth of the

cattle. It is a very costly way in which to warm barnyards. I want to say a word just here, in connection with housing your cattle, keeping them in the barn in cold weather, you have to warm the barn with animal heat and that involves a danger; you cannot put stoves in there, and no barn should be constructed so that the manure will freeze. I have not had the manure in my barn freeze for years. However, we should keep the air pure, and at the same time keep the barn warm.

There is another thing that I want to speak about. That is, retain the ammonia which is thrown off by the urine. It means eight or nine dollars every year. A cow will throw off from eight to ten pounds, and a horse more. Step into the stable of a horse that has been shut up and you will see what I mean. We often waste it and then buy it back at wholesale, in the shape of fertilizers, at seventeen cents a pound. A good way and a simple one to save this, is to use land plaster in the barn. It is the most powerful absorbent of ammonia in the world. I pay \$1.60 a barrel for it, and I would pay three for it rather than not have it on account of the additional value it gives me in my manure; and it also sweetens the air of my stables.

MR. HAZEN: Governor Hoard, you spoke of the nervous temperament being the reason why these three cows are better butter cows than the other one. I would ask why the Jersey and Guernsey produce more butter with the same amount of milk, than the Holstein?

GOV. HOARD: Because she is of the second division of the dairy temperament. She has not exactly the same nervous temperament.

MR. HAZEN: Is not that another reason why, at the many tests at fairs, etc., the Holstein exceeds the Jersey; and was not that question discussed in the papers at the time that this test which you have spoken of in your State, was made—that the Holstein was not as high-strung as the Jersey?

GOV. HOARD: Yes. And there is another law that comes in there. The cow is more uniform and steady, and it takes more to disturb her. Let me say to you, my friends, that I

can almost eliminate the butter fat that is in the milk of a cow, at a stroke. As an experiment I took a Jersey cow, and after I had milked up to a certain point, had taken about half of her milk, I set that aside and, with reluctance, took a pin and gave her a sharp rake across the flank. She sprang around in the stable and became very much excited. With a good deal of trouble I finally succeeded in quieting her, and I drew the rest of her milk. After analyzing this milk I found that there was a loss of fifteen per cent in the butter fats of the last of the milk as compared with the first. You can almost eliminate the butter fat from milk by exciting the cow. Therefore, as Mr. Hazen suggests, there is no doubt that public exhibitions of a cow of the highest nervous organization have the effect of seriously disturbing her and interfering greatly with the butter fat in the milk.

MR. HAZEN: A good cow wants a strong back, does she not?

GOV. HOARD: She wants a back with a large spinal process, not a wide back. I do not know as I should make any other distinction as to the shape of the back.

QUESTION: Do you think that you can take a Jersey calf and train her into a Hereford cow?

GOV. HOARD: No. These different types have been formed by a course of breeding extending over hundreds of years, and you cannot destroy all that work in one generation. If you give me two hundred years of fair honest time, I could breed the Hereford into the Jersey. I would enhance the nervous temperament and begin to discourage the phlegmatic.

MR. HAZEN: Another point has been brought to my mind within a few days. A man said that he had some Jerseys and bred them with Holstein, and he was going to cross once more with the Holstein and then breed them back to Jerseys. What kind of cross would that be?

ANSWER: I should say that he would have rather a hash breed, because I believe that crossing makes hash. He would have no heredities, that would be all broken up completely, and it takes heredity to make a breed.

QUESTION: Why do you assume that there is not just as much development of the nervous temperament in the Holstein as in the Jersey?

GOV. HOARD: I have not.

QUESTION: I took it that way when you answered one of Mr. Hazen's questions, you agreed with him.

GOV. HOARD: You can develop the nervous temperament to a condition of excitability, but we must not confuse that with the nervous temperament. You speak of a man of nerve and you mean a man perfectly cool and collected and one who has the power of controlling his nervous action. You speak of a man who is nervous, and we mean a man whose nerves are all unstrung. We should say, nerveless. You can bring the nervous temperament up to a degree of excitability which works to your injury. This animal has not been developed up to that degree of excitability that the Jersey has. The Stoke Pogis, for instance, is more commonly equitable and steady, and yet she is a strain of the Jersey. They are not as excitable as the Pansy or the Alpha family. The Stoke Pogis, as a type, had a wonderful constitution and yet she was inbred.

These things I cannot fully explain, but I think I see indications of the law underlying the whole theory of breeding.

MEETING AT CHESTER, MARCH 12, 1891.

An interesting and profitable meeting was held at this place. The party was met at the station by county member O. M. Tenney, who took us to his house and after dinner to the town hall. Although the roads were muddy, the afternoon meeting was fully attended. Professor Whitcher, of the Experiment Station, after opening remarks by the president, spoke intelligently for forty minutes on "dairy breeds." He gave in an interesting manner an account of experiments conducted at the station with four leading dairy breeds. He differed with many in regard to the general purpose cow, and thought there was danger of weakening the constitution in

breeding the special purpose cow, thus defeating the object sought.

He condemned the practice of forcing any of the breeds to such enormous production for the sake of advertising, although it might be justifiable in some cases. The speaker said that dairying was the farmer's sheet-anchor, and that was why the station had selected the dairy breeds for experimentation.

He was sorry that the Guernsey had not been one of the breeds selected as a representative of the Channel Island cattle. The breeds selected were the Jersey, Ayrshire, Holstein and Short-horn.

The Jerseys made 269 pounds of butter a year. The Ayrshire made 267; the Holstein, about the same; and the Short-horn, 261 pounds. In cost of product the Ayrshires led. The Short-horns came next, followed by the Jersey, and the Holstein, which was the least economical. He said it cost about \$45 a year to keep a cow, while many did not return an income of over \$30 a year, while others returned \$50 and some \$70 even. If a man can select six cows from a herd of nine that will yield more income than the whole nine — why keep the other three?

The majority had better select good grades and breed to a thoroughbred bull than wait until able to purchase a herd of thoroughbreds. By pursuing this course and making careful selections, great progress could be made by a farmer in ten years and a good herd be built up at small cost.

He advocated selling milk by the amount of total solids contained therein, as there was so much difference in breeds and individuals.

Some questions followed but the speaker was obliged to hasten to the train to meet an engagement in Massachusetts.

The officers of the association present all took part in the evening meeting, but the paper assigned Col. Curtis, of Manchester, was the leading feature of the session and will be given in full:

FOODS AND FEEDING FOR MILK.

BY COL. T. D. CURTIS.

There is no subject of greater importance in agriculture than that of feeding, whether it be feeding animals or feeding plants — and plants must be fed or there is nothing on which to feed animals. Plants are fed only for growth and development; but animals may be fed for growth and development, for simply maintaining them without growth, for sustaining them at work, for laying on fat and for the production of beef and milk. This implies intelligent feeding for a specific purpose. But most feeding is unintelligent, haphazard, general-purpose feeding, without knowledge of the character of different foods, no matter what the desired purpose may be, or whether the foods given will effect the purpose. It is done as the old doctor is said to have administered medicine in cases which he did not understand. He had a big bowl into which he threw all kinds of little surplus doses of medicine, and it contained a little of everything known to *materia medica*. So when he encountered a case that he could not diagnose, he administered a dose from the bowl which he used as a catch-all, on the theory that there might be something in it that would fit the case. Of course his aim was to cure, though he stood quite as good a chance to kill. In the same way, most farmers feed their stock. They grow and save a variety of foods. Their desire is to sustain their animals and get the most out of them. So they dose them with all kinds of feed during the feeding season, on the theory that some of it must produce the desired result.

Foods are not only of various kinds, but are made up of various elements. It is found that these foods may, for practical purposes, be divided into two classes. Each class of food contains most of the same elements, but in greatly varying proportions. But in practice it is found that we need to look after only *two* elements. When we have these in the right proportion to each other, we need not consider the others, as they are usually present in the right proportion and amount.

Foods containing a large proportion of one set of elements are called nitrogenous. They are also known as albuminoids and proteines, because these contain a comparatively large proportion of nitrogen — a gas very abundant in our atmosphere. But for our present purpose, in order to avoid confusing the memory, we will call this class of foods nitrogenous.

Another class of foods is known as carbonaceous. They are also known as carbo-hydrates, because they contain carbon and water; and they are known as non-nitrogenous, or without nitrogen, which is not quite true, however, but they contain a comparatively small proportion of it. They are also called foods of respiration. But we, on this occasion, will speak of them only as carbonaceous, because their leading element is carbon, which is also found in our atmosphere, but not so abundantly as nitrogen. I am trying to reduce this subject to the fewest and simplest terms, so as to avoid confusion and forgetfulness.

We clearly understand, now, I think, that we are to consider two classes of foods. One we call nitrogenous. The other we call carbonaceous. Now what are the leading characteristics of these two classes of foods? What is it that so widely distinguishes them apart?

Nitrogenous foods go to build up tissue, to make muscle and beef, to make milk, and especially cheese. Without nitrogenous foods there can be no growth, no development, no production of beef and milk. To some extent, nitrogenous foods are convertible into fat and heat, but they cannot be fed alone without great waste; and the more nitrogenous they are, the more likely the animal is to become diseased and die. They are one-sided foods and need to be united with foods that make up the other side. You may have noticed that in this world most things go by pairs. What is one blade of the shears good for without the other? What would man be without woman? One sex cannot procreate without the other. There can be no production without the positive and negative forces. Nitrogenous foods may be said to contain

positive forces, but they are powerless for results without the negative forces.

The carbonaceous foods contain these negative forces. Animals fed on these alone finally die of starvation; but unite the carbonaceous with the nitrogenous foods and we have a complete whole. With the two, we can so balance the ration that there will be only a minimum of waste. While the nitrogenous elements mainly go to build up tissue and muscle and to produce milk, the carbonaceous foods supply heat to the system and lay on fat. They oxidize in the body, thereby generating heat, and, uniting with nitrogen, supply force, energy, motion, and general activity. It is the business of science to find out just how to combine the two—the nitrogenous and the carbonaceous elements of food—so as to promote economy and secure the best results.

Bearing in mind these two classes of foods and their characteristics, the next thing is to distinguish them and tell to which class the several foods of the farm belong. We also want to know in what proportion to combine them for feeding purposes. Here we are compelled to refer to the feed tables of Europe and this country. Those of this country are based on the German standards, and have the same mode of expression. The German daily ration for a milch cow, for every 1,000 pounds of live weight, is, of digestible material, 2.5 pounds of nitrogenous matter, 12.5 pounds of carbonaceous matter, and 0.40 pound of fat.

The feeding ratio for milk is one pound of nitrogenous matter to 5.4 pounds of carbonaceous. It must be borne in mind that only the digestible portion of any food is available; and hence, in the feed tables, an average of the digestible portions of each food is given, and every feeder must judge for himself as to whether his foods are average, or above, or below, in nutritive quality. Very much depends on the quality of the several foods used. Unless this is correctly estimated, the feeding ratio, however carefully the ration may be weighed out, is not likely to very closely approximate the correct standard.

We will now consider a few of the leading foods under three heads: 1. Those that are classed as nitrogenous; 2. Those that are classed as carbonaceous; 3. Those that may be considered fairly well balanced. Anything below 1:4.5 we will consider nitrogenous; anything above 1:6.0 we will call carbonaceous; and all having a feed ratio between these figures we will class as balanced foods.

NITROGENOUS FOODS.

	Nitrogenous.	Carbonaceous.	Fat.	Ratio as 1 to
Japan clover	10.70	38.00	2.10	4.0
Cow pea vines	9.56	37.02	1.34	4.2
Cow pea	18.48	54.53	1.07	3.1
Soya bean	31.14	27.48	15.59	2.0
Brewers' grains, wet	4.06	9.73	1.41	3.2
Brewers' grains, dry	14.52	37.41	4.77	3.3
Malt sprouts	18.82	52.95	0.88	2.3
Cotton-seed meal	35.75	22.25	11.65	1.4
Pasture grass	2.50	9.90	0.40	4.4
Red clover, extra	10.70	37.60	2.10	4.0
Lucerne, medium	9.40	28.30	1.00	3.3
Vetch hay	9.40	32.50	1.50	3.9
Pea hay bloom	9.40	33.10	1.60	4.0
Lupine, medium	11.30	37.33	0.70	3.4
Pasture grass	2.50	9.90	0.40	4.4
Rich pasture grass	3.40	10.90	0.60	3.6
Pasture clover, young	3.60	7.40	0.60	2.5
Red clover before blossoming	2.30	7.40	0.50	3.8
White clover in blossom	2.20	7.90	0.50	4.2
Swedish clover beginning to blossom	2.10	5.80	0.40	3.2
Esparsette	2.10	8.00	0.30	4.1
Fodder pea, blossom	2.20	7.40	0.30	3.7
Green rape	2.00	4.80	0.40	2.9
Carrot leaves	2.20	7.00	0.50	3.8
Fodder beet leaves	1.20	4.00	0.20	3.7
Rutabagas	1.50	5.10	0.30	3.9
Lupine ensilage	2.40	7.00	0.30	3.2
Beet leaf ensilage	2.00	6.30	0.70	4.0

	Nitrogenous.	Carbonaceous.	Fat.	Ratio as 1 to
Red clover ensilage	2.80	7.20	1.70	4.1
Peas	20.20	54.40	1.70	2.9
Field beans	23.00	50.20	1.40	2.3
Vetch	24.80	48.20	2.50	2.2
Lentil	21.40	51.20	2.20	2.6
Yellow lupine	34.40	41.80	4.90	1.6
Blue lupine	23.60	54.20	4.60	2.8
Cow pea, American	19.40	49.60	1.10	2.7
Serradella	19.80	47.00	7.30	3.2
Chinese oil beans	34.50	28.30	18.10	2.1
Buckwheat bran	13.50	44.00	3.90	4.1
Pea meal	20.90	55.40	2.80	3.0
Hempseed cake	20.90	17.40	5.20	1.5
Walnut cake	31.10	28.20	11.20	1.8
Sunflower cake	31.30	24.70	7.60	1.3
Pumpkin seed cake	50.00	9.70	10.30	0.7
Rape cake	25.30	23.80	7.70	1.7
Rape meal, ex.	26.50	27.20	2.40	1.3
Beechnut cake	13.50	22.20	6.60	2.8
Palmnut cake	10.00	16.10	9.50	4.9
Cotton-seed meal, dec.	33.20	17.60	8.00	1.1
Cotton-seed meal, und.	17.50	14.90	5.50	1.7
Cow's milk	3.20	5.00	3.60	4.4
Skimmed milk	3.50	5.00	0.70	1.9
Buttermilk	3.00	5.40	1.00	2.6
Linseed cake	29.04	33.09	4.53	1.5
Linseed meal, o. p.	25.85	26.52	7.08	1.6
Linseed meal, n. p.	28.25	27.95	2.80	1.3
Rye bran	12.00	48.98	1.43	4.4
Wheat bran	11.72	44.66	2.58	4.4
Gluten meal	23.30	50.92	3.85	2.5
Buckwheat middlings	23.60	29.30	5.20	1.8

All these are not only strong foods, because containing a great deal of nitrogen or being very nitrogenous, but most of them are very concentrated and should be fed only with bulky foods that are carbonaceous. Not only is a proper proportion of carbonaceous elements required, but they must be

bulky enough to properly and comfortably distend the cow's stomach.

Let us next consider the fairly balanced foods, such as have a feeding ratio of 4.5 to 6 — that is, one part of nitrogenous elements to 4.5 and 6 parts of carbonaceous elements.

FAIRLY BALANCED FOODS.

	Nitrogenous.	Carbonaceous.	Fat.	Ratio as 1 to
Clover hay	7.82	40.25	1.49	5.6
Johnson grass	6.70	41.00	1.20	6.0
Rye fodder	1.51	8.20	0.26	5.8
Clover, green	2.70	12.78	0.44	5.0
Clover ensilage	2.20	10.98	0.65	5.7
Oat meal	11.29	50.15	5.79	5.6
Wheat middlings	11.60	48.87	2.68	4.7
Wheat shorts	10.79	44.80	2.85	4.7
Rice bran	9.97	48.66	3.61	5.7
Dried sugar meal	10.20	54.50	5.40	5.4
Oat feed	10.26	39.87	5.70	5.2
White clover hay, medium	8.10	35.90	2.00	5.0
Alsike	8.60	34.80	1.80	4.6
Serradella, dry	8.50	36.20	2.80	5.1
Red top hay, blossom	10.30	53.10	2.60	5.4
Wire grass, early blossomed	10.20	52.70	4.00	4.5
Bermuda grass hay	9.16	46.00	1.80	5.2
Quack grass	9.80	48.20	3.00	5.2
Italian rye grass, green	2.30	12.60	0.40	5.9
Red clover, blossom green	1.70	8.70	0.40	5.7
Trefoil	1.50	7.50	0.30	5.5
Serradella, green	1.90	8.90	0.70	5.6
Buckwheat, blossom green	1.50	6.60	0.40	5.1
Fodder cabbage	1.80	8.20	0.40	5.2
Turnips	1.10	6.10	0.10	5.8
Wheat grain	11.70	64.30	1.20	5.8
Millet	9.50	45.00	2.60	5.4
Cotton-seed	17.10	14.70	27.30	4.6
Coarse wheat bran	10.00	48.50	3.10	5.6
Rye bran	10.60	50.00	2.00	5.3
Pea meal bran	9.20	45.80	1.20	5.3

	Nitrogenous.	Carbonaceous.	Fat.	Ratio as 1 to
Barley bran	11.50	43.20	3.60	4.5
Distillery refuse	1.60	5.40	0.80	4.6
Wheat meal	10.80	54.80	2.90	5.7
Barley middlings	9.60	17.00	3.20	6.0

All these articles are sufficiently balanced, as between the nitrogenous and carbonaceous elements, but some of them need to be fed with bulkier foods. We next consider the

CARBONACEOUS FOODS.

<i>Hay.</i>	Nitrogenous.	Carbonaceous.	Fat.	Ratio as 1 to
Meadow, medium	5.40	41.00	1.00	8.0
Meadow, good	7.40	41.70	1.30	6.1
Rye fodder	6.60	44.30	1.30	7.2
Timothy	5.80	43.40	1.40	8.1
Early meadow	6.00	42.50	2.10	7.9
Orchard grass, blossom	6.90	40.30	1.90	6.5
Sweet-scented, vernal	5.90	40.10	2.10	7.6
Blue grass, blossom	5.90	40.00	1.60	7.5
Sheep fescue	8.80	57.10	3.60	6.9
Meadow foxtail	7.80	49.60	3.20	6.7
Fowl meadow grass	7.50	49.00	2.90	6.9
Wire grass, bloom	10.20	52.70	4.00	4.5
Barnyard grass	6.70	46.40	1.80	7.2
Italian rye grass	7.10	41.50	1.40	6.3
English rye grass	5.10	35.30	0.80	7.3
Hungarian grass	6.10	41.00	0.90	7.1
<i>Green.</i>				
English rye grass	1.80	12.20	0.40	7.2
Timothy	2.10	16.00	0.50	8.2
Maize, German	1.00	8.40	0.20	8.9
Fodder rye	1.90	11.00	0.40	6.3
Fodder oats	1.30	8.90	0.20	7.2
Sorghum	1.60	11.90	0.30	7.4
Hungarian, blossom	1.80	11.80	0.30	7.0
Cabbage stems	0.80	11.50	0.20	15.0
Corn ensilage	0.80	8.60	0.40	12.0
Potato top ensilage	1.20	6.20	1.30	8.0

<i>Straws.</i>	Nitrogenous.	Carbonaceous.	Fat.	Ratio as 1 to
Winter wheat	0.80	35.60	0.40	45.8
Winter rye	0.80	36.50	0.40	46.9
Winter barley	0.80	31.40	0.40	40.5
Summer barley	1.30	40.60	0.50	32.2
Oat	1.40	40.10	0.60	29.9
Fodder vetch	3.40	31.09	0.50	9.8
Pea	2.90	33.40	0.50	12.0
Field bean	5.00	35.20	0.50	7.3
Seed clover	4.20	28.50	1.00	7.4
Buckwheat	1.40	36.00	0.40	26.4
Corn stalks	1.10	37.00	0.30	34.4
Corn cobs	0.60	41.70	0.40	71.2
<i>Roots, etc.</i>				
Potatoes	2.10	21.80	0.20	10.6
Artichokes	2.00	16.80	0.20	8.7
Fodder beets	1.10	10.00	0.10	9.3
Sugar beets	1.00	16.70	0.10	17.0
Rutabagas	1.30	10.60	0.10	8.3
Carrots	1.40	12.50	0.20	9.3
Parsnips	1.60	11.20	0.20	7.3
<i>Grains.</i>				
Rye	9.90	65.40	1.60	7.0
Barley	8.00	58.90	1.70	7.9
Oats	9.00	43.30	4.70	6.1
Maize	8.40	60.60	4.80	8.6
Golden millet	7.20	47.00	3.10	7.5
Buckwheat	6.80	47.00	1.20	7.4
Sunflower seed	10.40	24.60	21.20	7.2
Palm seed	8.00	31.20	48.20	18.3
Acorns, fresh	2.00	30.90	1.50	18.2
Chestnuts, fresh	3.40	35.70	1.30	11.5
Apples and pears	0.30	12.90	.00	43.0
Pumpkins	0.40	7.10	0.10	18.4
Sugar beet cake	1.80	24.60	0.20	13.9
Corn bran	6.20	55.00	3.60	10.3
Corn sugar meal	3.20	19.30	1.80	7.4
Green malt sprouts	5.20	36.90	1.20	7.7
Oat bran	5.60	49.80	2.00	9.7
Condensed milk	10.20	52.90	12.90	8.8
Whey	1.00	5.10	0.60	6.6
Cream	2.70	2.90	31.80	30.5

These foods must all be strengthened by the use in connection with them of other foods, generally, but not always, more concentrated as well as nitrogenous. The tables show the per cent of all the constituents, or the number of parts in a hundred, and the ratio column shows how the ingredients are proportioned as to their nitrogenous and carbonaceous qualities. Now the point is to so combine the different foods as to approximate a proper ration. With the extremely carbonaceous and bulky foods must be mixed enough of the concentrated and condensed nitrogenous foods to make a due balance of the two leading elements. Then if the ration is not large enough, more of the same kind may be added, or enough of the foods that are balanced, or nearly so, may be included to make up the desired amount. These can be added without disturbing the balance to any material extent. Indeed, as will be seen by the balanced table which I have given, the ration may be broadened and narrowed considerably; and this will always be done more or less by variations in the nutritive qualities of the foods, at which the common feeder can only guess. Hence, it is fortunate that this variation of the ration does no particular harm.

Professor Armsby says: "The feeding standards are not inflexible rules, to be blindly followed, but guides and indicators, which must be intelligently adapted to local and individual circumstances." And I wish to add that these standards and feeding tables are largely made up of averages, estimates, and guesses. Chemistry itself is not as exact as many may suppose, and the best chemists claim its results as only closely approximate. But were the standards, the tables, and the chemical analyses mathematically correct, the individual variations in animals, and the variations in the quality and condition of foods would afford an element of uncertainty that would call for the most careful observation and the wisest exercise of judgment on the part of the feeder. But, as guides, the standards and feed tables are of incalculable value to the feeder who desires to feed his animals as nearly as possible on a scientific and economical basis.

Now, when we have the foods, and the feed tables, and the standards, how shall the feeder go to work to prepare a ration for his animals? Let us make up one for a milch cow weighing 1,000 pounds—a ration for the day, to be fed in two or three meals.

We want the cow to have approximately 2.5 pounds of digestible nitrogenous material, 12.5 pounds of carbonaceous material, and .4 pound of free fat to aid in the digestion of the nitrogenous matter, and this gives us a ration having a nutritive ratio of 1 : 5.4. What are our foods? We will suppose we have clover hay; we have timothy hay; we have corn or maize ensilage; we have bright oat straw. These are our coarse and bulky foods. For our grain ration, we have corn meal; we have cotton-seed meal; we have wheat bran; we have linseed meal; we have oatmeal. Here is nothing that we cannot raise on the farm, except the cotton-seed and the linseed meal, both of which we wish to use sparingly. We will try to combine these so as to use the most of those foods which we have the most of. We will take 5 pounds of clover, 10 pounds of corn ensilage, 10 pounds of oat straw, and 5 pounds of timothy—in all, 30 pounds of coarse, bulky food. To this we will add 2 pounds of corn meal, 2 pounds of oatmeal, 1 pound of cotton-seed meal, and 1 pound of linseed meal—in all, 6 pounds of grain feed. We must have in all 25 pounds of dry material—that is, dried at a temperature of 212 degrees. The ensilage contains 70 per cent of water; the other foods are only air-dried, but we think we have about the required amount. Now I have put these foods together on a mere guess, just as any one could who knows something of the character of each. I know the clover is quite nitrogenous, and the timothy moderately carbonaceous. The two will about balance each other. The ensilage is highly carbonaceous and the oat straw still more so. The coarse foods are, therefore, very bulky and very carbonaceous as a whole. Now I come to the grain. The corn meal is quite carbonaceous, but I want it to color and flavor the butter. Besides, I use a moderate amount of ensilage. If I use more, I would

not need to put in the corn meal. The oatmeal is well balanced and concentrated strong food, good for muscle and good for milk. Cotton-seed meal is very nitrogenous and strong, as well as fatty, hardens the butter and has a constipating tendency. The linseed meal is also counted strong in nitrogen, is oily, and has a relaxing tendency, thus counteracting the opposite tendency of the cotton-seed meal, while making the butter more oily, thus again counteracting the cotton-seed.

This is all given in a general way, to show you the operations of my mind in putting the ration together. Now let us put it to the test of the standard and the digestion tables. So we will set these down, on another page, in the form of a table, the columns running up and down. We turn to the digestion table and find good clover hay has 8.5 per cent of available nitrogenous material. We multiply this by 5 and get 42.5. This we divide by 100, and find after cutting off the decimals, we have .42 or a little over 4-10 of a pound. We set this in our table, under the head of "nitrogenous," the decimal point to the left of the figure 4. We refer to the table again and find that our clover has 38.2 per cent of carbonaceous material. We multiply by 5 and get a product of 191. There is no decimal to drop here. So we divide by 100 and have 1.91 of a pound of available carbonaceous material. We place this under the head of "carbonaceous," the decimal point after the first 1 and before the 9. Now we refer for the fat. That we find is 1.7 per cent. As in the other two cases we multiply this by 5 and find we have 85 as our product. We cut off the decimals and divide by 100 and find we have only .08 of a pound of available fat. This we write under the head of "fat," in our table, the decimal point being followed by a cipher between it and the 8.

In this way, we go through the whole list of foods, multiplying the per cent of each ingredient by the number of pounds of digestible food taken, dividing by 100, and putting the quotient in its proper place in the table. Finishing it, we find it deficient in both nitrogenous and carbonaceous mate-

rial. In other words, it is too weak. Referring back, we find wheat bran was named among the foods on hand, but omitted from the ration. We now add 2 pounds of this popular food, making 8 pounds of grain feed, and find we have a satisfactory ration of 38 pounds — water, waste, and digestible material as follows:

							Nit.	Carb.	Fat.
5	pounds clover .	.	.	.	.	.	.40	2.01	.07
10	" ensilage .	.	.	.	.	.	.11	1.09	.05
10	" oat straw .	.	.	.	.	.	.14	4.01	.06
5	" timothy .	.	.	.	.	.	.29	2.17	.07
2	" corn meal .	.	.	.	.	.	.15	1.27	.06
2	" oatmeal .	.	.	.	.	.	.22	1.00	.11
1	" cotton-seed meal .	.	.	.	.	.	.36	.22	.11
1	" linseed meal .	.	.	.	.	.	.28	.28	.03
							<hr/> 1.95	<hr/> 12.05	<hr/> .56
	2 pounds wheat bran .	.	.	.	.	.	.22	.80	.05
<hr/> 38							<hr/> 2.17	<hr/> 12.85	<hr/> .61
	Standard .	.	.	.	.	.	2.50	12.50	.40

We now want to find what the nutritive ratio is. To do this we multiply the fat by $2\frac{1}{2}$ and add the product to the column of carbonaceous material. Why? Because free fat is considered worth $2\frac{1}{2}$ times more than the other carbonaceous materials, all of which have to first become converted by vital chemistry into fat before they become available. The free fat is at once available for digestive and assimilative purposes. By multiplying .61 by $2\frac{1}{2}$ we get 1.25. This added to 12.85 makes the sum of 14.37. We divide this sum by the nitrogenous elements, 2.17 and it gives us the quotient of 6.62, which is the proportion of carbonaceous material to one of nitrogenous. Or, as we would say, the nutritive ratio is as 1 : 6.62, whereas, the German standard is 1 : 5.40. There is a little over 1 part more of carbonaceous material than the standard requires. We can easily change this by putting in less ensilage, straw, timothy, or corn meal, and adding more clover, cotton-seed meal or wheat bran. Or we can feed a little more freely, and let a portion of the cheap carbonaceous material go to waste. We will see the effect on the herd.

We find our hurriedly made-up ration a little deficient in nitrogenous material; but, for a winter ration, it is probably better than the German standard would be. Anything not above 1 : 7 is considered within the limits of permissible variation. Indeed, if I remember right, Professor Whitcher once expressed the opinion that the New England dairymen would not find butter-making profitable with a ration narrower than 1 : 7. Most herds are kept on a still wider ration. Timothy hay, a favorite food, averages about 1 : 8, and often not enough of that is supplied. In summer, on pasture grass, when carbonaceous material is not so much needed to keep up the temperature of the body, the ration is much narrower — often down to 1 : 4.

Of course, it will at once be seen that the feeding ration can be easily varied. With the material contained in our supposititious ration, we could make it just as satisfactory, and perhaps more so, by taking half the number of foods and doubling the weight. I should prefer to vary it in this way, in order to vary the flavor and add to its relish.

A word in regard to the range of the ration. As a rule, I think the ration is generally figured too narrow, even for the German standard. We adhere too closely to the rations for milk, meat, and work, and certainly figure much narrower than the rations which the farmers are in the habit of feeding. We overlook the fact that for cattle at rest the ratio may be as wide as 1 : 12; and for sheep producing wool, 1 : 8 or 9; that the moderately worked ox requires a ration of only 1 : 7.5. In fact, anywhere from 1 : 7 to 1 : 12 is allowable, unless some special demand is made on the system of the animal.

How are we to know when animals are fed enough? I know of no better way to find out than to carefully watch them and feed only what they will eat up clean at once, and then give them about the same time to digest the meal that we take to digest our own. Three good meals a day, the first early and the last late, are enough; and some think that two meals, fed morning and night, are enough. Judging by myself, I think three meals a day preferable.

I would prepare my meal ration with due care as to its materials and the fodder I had to feed with it, so as to approximate a balance of about 1:6, and give all the coarse fodder needed — say ensilage in the morning, straw and roughage at noon, and good hay at night. If I thought some were getting too much, I would reduce the grain ration; if not enough, I would increase the grain ration, and in this way adjust the feed to the individuality of the animal and to the work performed.

In conclusion, I have tried to make my subject clear to the understanding of my hearers. If I have failed, I have the consolation of being in company with many a better man. If I have succeeded, I have done a good work, for which I need to be rejoiced. But do not be discouraged. I am not a scientific nor even what is known as an educated man. With but few of the elements of a common country school education, I have picked up what little I know as I have worked my way through the world. You certainly can do as well, and I believe much better.

J. L. GERRISH,
Secretary.

PATRONS OF HUSBANDRY.

OFFICERS OF THE NEW HAMPSHIRE STATE GRANGE, 1891.

CHARLES McDANIEL, <i>Master</i>	.	.	West Springfield.
JAMES E. SHEPARD, <i>Overseer</i>	.	.	New London.
JOHN D. LYMAN, <i>Lecturer</i>	.	.	Exeter.
FRANK H. WELD, <i>Steward</i>	.	.	Cornish.
HOWARD B. HOLMAN, <i>Assistant Steward</i>	.	.	Laconia.
REV. GEORGE W. PATTEN, <i>Chaplain</i>	.	.	Dublin.
JONATHAN M. TAYLOR, <i>Treasurer</i>	.	.	Sanbornton.
NAHUM J. BACHELDER, <i>Secretary</i>	.	.	Andover.
HENRY MOORE, <i>Gate Keeper</i>	.	.	Goffstown.
MRS. CHARLES McDANIEL, <i>Ceres</i>	.	.	West Springfield.
MRS. GEORGE J. BENNETT, <i>Pomona</i>	.	.	Westmoreland.
MRS. NAHUM J. BACHELDER, <i>Flora</i>	.	.	East Andover.
MRS. EMRI C. HUTCHINSON, <i>Lady Steward</i>	.	.	Milford.

EXECUTIVE COMMITTEE.

CHARLES McDANIEL, <i>Chairman</i>	.	.	Springfield.
CHARLES H. PATTEE, <i>Secretary</i>	.	.	Hanover.
NAHUM J. BACHELDER	.	.	East Andover.
LUCIEN THOMPSON	.	.	Durham.
DANIEL W. RUGG	.	.	Sullivan.
E. C. HUTCHINSON, <i>General Deputy</i>	.	.	Milford.

SECRETARY'S REPORT.

The seventeenth annual session of the New Hampshire State Grange was held at City Hall, Manchester, December 16, 17, and 18, 1890, and was the largest and most enthusiastic meeting yet held by the organization. The meeting was called to order at 11 o'clock A. M., by Master Charles McDaniel, with the remaining officers nearly all present and at their respective stations. The first business after the ritualistic service of opening the meeting was the conferring of the fifth degree upon twenty-six members who were entitled to receive it. This was followed by the appointment of the committee on credentials, consisting of E. C. Hutchinson, Milford; H. O. Hadley, Temple; D. H. Tufts, Strafford; Mrs. E. M. Tuttle, East Andover; Mrs. D. R. Wyman, Concord. After consultation the committee submitted a report announcing the presence of all the officers and one hundred and forty-two credited delegates. There was also present a large number of members of the order from various sections of the State. After the reading of the report in detail, the grange took a recess until 1.30 o'clock P. M.

AFTERNOON SESSION.

After the formal opening of the session and the preliminary exercises attending, Master McDaniel delivered the following annual address.

ANNUAL ADDRESS.

BY CHARLES MCDANIEL.

Officers and Members of the New Hampshire State Grange, Sisters and Brothers of the Order Patrons of Husbandry:

Time in its onward march brings us together again in annual session to council for the interest of our fraternity, our homes, and our country. History informs us that it was a sacred rule among the Pythagorians, at the close of each day,

to run thrice over the actions and affairs of the day, to ascertain wherein they had succeeded and wherein they had failed or erred. Thus they promoted their own personal welfare, happiness, and prosperity; and as they were truly a happy, prosperous people, they are worthy of our imitation.

Taking into consideration the work that is being done in our own State by our one hundred and twenty-five active working Granges, with a membership of over nine thousand, it appears to be a wise provision in our constitution and organic law, that we look carefully at the work we have done during the past year, at our successes as well as our failures, that we may plan wisely and hopefully for the future. This seventeenth annual session of our State Grange brings with it many new members as well as visitors from all parts of our Granite State. We found these also at the twenty-fourth annual session of the National Grange, that held its meetings in the Gate City of the South, Atlanta, Georgia, November 12 to 20, 1890. A copy of the journal of proceedings will soon be sent to each Subordinate Grange. Like its predecessors, it will be found to contain the results of deliberations of representatives from thirty-two States. It should be not only read, but discussed by the members of each Grange in the State. The master's address, full of thought, and a recapitulation of his year's work, demands our attention. The report of the executive committee should also be considered, as it not only gave the record of work done during the year, but submitted several recommendations which were ably discussed by the members of the National Grange, together with the amendments presented to said report.

During the past year the following amendments have been ratified by the requisite number of State Granges, and are adopted: Article 14, page 18, of the Digest, by striking out the words, "three fourths," where they occur in the third line of said article, and insert in lieu thereof the words "two thirds." Also amend Article 7 of constitution of National Grange by adding thereto "provided that the State Granges shall have the power to reduce the fees within their respective

jurisdictions to any sum not less than one dollar for men, and fifty cents for women." If we think it will be for our interests to reduce our initiation fees, it will be necessary to amend our state by-laws.

An amendment to the constitution, proposed by the National Grange to the State Granges for ratification or rejection, reads as follows: Amend Section 1, Article 1, under the head State Grange, by inserting between the words "matron" and "provided," where they occur in the third line of said section, the following: "And such fourth degree delegates as may be found necessary to secure to each Subordinate Grange two representatives. The fourth degree members above provided, to be chosen in such manner as the respective State Granges may prescribe."

JUVENILE GRANGES.

The executive committee of the National Grange, agreeably to vote in 1889, proposed a manual for Juvenile Granges, which was adopted by the last session of the National Grange. This work is designed for Patrons' children under fourteen years of age. It is to be adopted by the State Grange whenever used.

POMONA GRANGES.

We have organized Mascoma Valley Pomona Grange, No. 7, at Lebanon, since our last state meeting, with one hundred and fifty charter members, and several additions have been made since to its membership. This Grange, like its predecessors, has done valuable work for its members, and aided the farmers in the vicinity to see the power of organization. These granges should doubtless confine their work to members who are the supporters of this branch of our order. We think we are benefiting and being benefited by holding one public session during each meeting, that our work may be seen and investigated by our brother farmers. Other agricultural and farmers' organizations have increased in members during the past year. They doubtless hoped to secure similar results to those attained by the Grange, but some were organ-

ized for special purposes, either political, financial, or social. Our organization has stood the test of the past twenty-four years, and we have been indeed dull have we not profited by this long existence. We aim to be progressive; to keep pace with the improvements of our country; to be always ready to do whatever is apparent for the best interests of the farmer, whether social, moral, financial, or political. The political interests should be considered in the true sense of politics and not in a partisan view, for we seek the greatest good to the greatest number.

We continue to have an abiding faith in our Declaration of Purposes, written by Brother Wright, one of our country's best educators, who was with us at our National Grange meeting at Atlanta, and whose photograph, together with that of Brother Sanders, the first master of the National Grange, is before you.

EDUCATION.

Our State Experiment Station is keeping abreast with the progress of the day. Valuable work has been done during the past year. The several bulletins that have been issued and distributed among our farmers have been of untold value to those who have read them and profited thereby. We fear that too few visit the station and examine the work which is done there, and thus ascertain the points in which they should be personally interested. Valuable additions have been made to the farm buildings and machinery, as well as to the scientific department. It is a very easy matter to criticise the work of our public servants, especially when the account current is made up for the fiscal year. We must recollect that the work of the station is not to make the most dollars at the present time, but to educate in the various lines of work. This may be illustrated by the work now being done in a distant State in a special line of scientific work in which the people of that State are specially interested. We were told by the director of that experiment station that, in an average, for twenty-five dollars' worth of product the cost was one hundred dol-

lars for production and manufacturing. Men in the same practical line of work were examining results as well as details. Let us as Patrons and farmers avail ourselves of the benefit of our Educational Agricultural Experiment Station. Your committee appointed at the last session will doubtless give you, during this meeting, the result of their investigation.

COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

Our College of Agriculture and Mechanic Arts is becoming more popular and useful. Our friends are now largely increased through the munificence of the national government to equip laboratories and workshops; and additions are to be made to the faculty. We are to have several new departments and among them a special veterinarian department as soon as the practical, as well as educated theoretical man can be obtained for the position. This is a long felt want, not only to have the science taught but to have a man in our Agricultural college that we can look to as authority upon the diseases of our flocks, herds, and horses — one who can tell us to a certainty whether our stock is afflicted with fever, tuberculosis, *la grippe*, or some nameless disease, and advise as to what is the proper thing to do in the way of treatment.

Our mechanical department is to be supplemented with electrical engineering and other improved work. Let us do all we can to patronize these institutions and educate the rising generation of farmers to know their work equally as well as any of the so called professions. It is only too true that to be a successful farmer, in the broad meaning of the term, he needs more knowledge, general and specific, than any professional man. It is also intended to fill the chairs of entomology and horticulture, and thus make more complete all lines of agricultural instruction.

THE THOMPSON WILL.

The "Thompson will case" will be and has been the subject of much speculation in regard to the state and agricultural college. We hope and trust that wise and prudent

action will be taken by our Legislature-elect in regard to this valuable Thompson bequest. It does not appear that our State ought to let this valuable estate be removed from us, but accept the same. In the meantime, before said estate shall be used or available, let us do all we can to sustain, improve, and make powerful for good our present agricultural college in its present location. Let our common schools have textbooks on agricultural subjects, especially upon the growth of common plants, trees, shrubs, and vines. In this way our boys and girls may be taught to investigate natural things, and realize the wondrous work of God in nature, as well as in revelation. To this we would add political economy, and the laws of business in agriculture.

Then we have this broader institution, the Grange, which is the educator of the masses of farmers, their wives, and their children. They are educated in their meetings, where essays, papers, and discussions are participated in by all, each in his own private sphere; where social, intellectual, and moral principles are inculcated, and temperance is supported. All over our broad country we find among our agricultural class more or less grumbling because their business does not pay better profits. In portions of some States the people are boasting of their soil and climate, their crops, and their natural and acquired advantages. They are truly happy, simply because they have adapted themselves to their circumstances, and having applied business principles, the results are satisfactory. Still there is agricultural depression all over the country. Our land here in New England may have been cropped more than those of the South and West, and failed to yield as big returns; but we are near our market; we have social advantages; and our skill and industry make our own agricultural location one to be proud of. Now that agriculture is recognized as one of the departments of the government, and owes that recognition, in a measure, to the Grange, we hope that the secretary of agriculture will look well to our interests. To secure our just rights we must study our political condition, consider what legislation bears directly or

indirectly for and against us, then, united by our voice and votes, correct any improper and unjust laws. Again, we recommend to the careful consideration of the Grange the "Australian ballot system," or a similar one, or a measure intended to purify and promote the freedom of the ballot.

THE PRESS.

We recognize the power the press has exerted in promoting the welfare of our order. The change in tone of our state and local papers is noticeable. We owe a debt of gratitude to many of our papers that have so ably defended our principles. Without booming any particular publication, we suggest that in the future our order patronize as many of the local and state papers as practicable.

WOMAN'S WORK.

Woman's work in the Grange is identical with man's. She has an equal voice and vote, is eligible to each and all offices in the Grange, from the humblest in a Subordinate to the highest in the National Grange. The work she is accomplishing is above price. They inspire us with loftier and nobler purposes; their counsel and influence in our meetings are of a most salutary character. They are learning how to conduct business according to parliamentary law, and are becoming versed in the political situation of the country.

DEPUTY INSPECTION.

We believe our success in routine work has greatly improved since the system of "deputy inspection" has been adopted. The deputies have, I think, examined carefully the work, record, and financial standing, and with very few exceptions have found the laws and usages of the order faithfully executed. Irregularities have been corrected and the spirit of fraternity inculcated.

ARBOR DAY.

The Grange originated Arbor Day, to be spent in beautifying our homes, school and church grounds, streets, highways, and public parks.

Yet the Grange adds another charm by holding meetings on the eve of the day to report the ways and means adopted, the work done, and to discuss the manner of setting and pruning different varieties of trees, plants, and shrubs.

CHILDREN'S DAY.

Children's Day is now appointed by the National Grange master, and will doubtless be fully appreciated, especially by Juvenile Granges, whenever and wherever organized. The day is generally spent in listening to readings, recitations, and songs of an interesting and instructive character, while added to the mental feast is a feast of the best edibles the home affords.

STATE GRANGE FAIR.

The State Grange Fair continues to increase in size, and quantity and quality of its exhibits, in proportion to the membership of our organization. It has come to be one of the leading events of the year, and takes a very high rank among the fairs of New England. We have reason to be proud of this branch of our Grange work. May its shadow never grow less, and may the blessings of all good Patrons fall upon our friend and benefactor, Hon. Charles E. Tilton, who continues to help, aid, and assist in this noble work.

GRANGE MUTUAL FIRE INSURANCE.

Since the organization of our Grange Mutual Fire Insurance Company, July 20, 1888, we have continued to increase our business at a very rapid rate. Nothing yet has occurred to mar the prosperity of the company. We have issued 1,121 policies on property to the value of over \$1,400,000, and the rate has been only seven cents on \$100 for the past year's insurance. The Patrons' Relief Association is still under the charge of an efficient corps of officers and directors. Its aims and objects are probably well understood by every member of this Grange. It is the surest and safest life insurance, for its benefits are always paid when due. The finances of our

State Grange are in a safe and prosperous condition, as our expenses are kept within our income and we are annually laying by a surplus. A well filled treasury without an excessive surplus is always conducive to the prosperity of any organization.

IN MEMORIAM.

Memorial exercises will be held during this session, according to published order of business, this being one of our appropriately established customs. We are pained to record the following list of those who have been members of this body, but who have been called up higher to that celestial degree of the Great Grange above, presided over by that Master whose only gavel is love:

Sister Lila C. Hardy, wife of Past Master W. D. Hardy of Greenfield Grange, No. 23, died Jan. 14, 1890.

Brother Benjamin Q. Jewett, past master of Mt. Belknap Grange, No 52, died Feb. 13, 1890.

Sister Abbie C. Cogswell, wife of Past Master J. W. Cogswell of Crystal Lake Grange, No. 101, died March 30, 1890.

Sister Huldah M. Taylor, wife of Past Master J. M. Taylor of Harmony Grange, No 99, and treasurer of State Grange, died April 22, 1890.

Sister Maria Sherry, wife of Past Master Daniel Sherry of Monroe Grange, No. 49, died Aug. 13, 1890.

Sister Mary Burnap, wife of Master James Burnap of Excelsior Grange, No. 136, died Sept. 1, 1890.

Sister Phila M. Gage, wife of Past Master John Gage of Bear Hill Grange, No. 39, died Sept. 12, 1890.

Sister Mary E. Clarke, wife of Past Master M. D. Clarke of Warren Pond Grange, No. 47, died Nov. 6, 1890.

CONCLUSION.

We commit the business of the session to your hands, hoping and trusting that each and all may have an opportunity to place before this meeting any topic for discussion, any amend-

ments to our laws, and especially to offer such suggestions as may prove valuable to us as a whole.

For the many favors and courtesies received during the past, I return many thanks. Let us continue the good work so well begun, and as the Pacific States showed marked progress during the past year, so may our New England and Atlantic States prove themselves equal to any emergency in Grange work, until the whole farming community shall know and realize the power of the Patrons of Husbandry.

Hon. J. D. Lyman, lecturer, made the following report :

REPORT OF LECTURER.

BY JOHN D. LYMAN.

Worthy Master, Sisters and Brothers of the State Grange:

What a glorious sight greets my vision! What a meeting of the representative and progressive farmers of glorious old New Hampshire! After a century more or less of almost futile efforts to sustain agricultural societies in our towns, some fifteen of us, under the most unfavorable circumstances, started the first Grange in our State, and now I behold this large assemblage.

Here are the solid, sturdy men and noble women from the Upper Coös to the Bay State border — from the fertile valley of the Connecticut to Piscataqua's flowing waters — from beyond the mountains on the north, to where old ocean's pulse beats the river's shores — all gathered here in this Queen City and manufacturing metropolis of our State, to promote the great primal industry of man, and build up our New Hampshire. In the day of small things, eighteen years ago, had anyone predicted such a meeting as this, representing one and a quarter hundred agricultural societies and a membership of more than nine thousand, and holding some three thousand meetings a year, I say, had any one predicted such results, he would have been regarded as the wildest crank that ever wasted humor in making insane predictions.

During the year I addressed various agricultural meetings, and, if the people were as well pleased with my words as was I gratified by their work in building up this exceedingly useful society, and in studying the marvelously complicated and involved problems of agriculture, in order that their farms might be more productive and their homes more happy, then I am more than satisfied.

A few years since, how "like angel's visits, few and far between," were the gentlemen in the State, outside of the professions of law, theology, and politics, who ever attempted to address agricultural meetings. What a change for the better! I find at our meetings gentlemen have thoughts to tell, facts to state, experiments to describe, and suggestions to make, who can express what they have to say, both in words and manner which would be creditable to those who plead at the bar, lecture upon the platform, or minister at sacred altars. The papers by the ladies and their few remarks, and the recitations, readings, and declamations are of real merit, and would demonstrate, were proof needed, that these agricultural societies are of vast educational importance. The newspapers and essays read, and the books studied in preparing for these meetings, are numerous. In similar societies, the late Vice-President Henry Wilson, Governor Banks, our great Franklin, and many others received a large portion of the training which qualified them for the high positions which they filled.

I have often invited your attention to our State. Let us all appreciate this grand old New Hampshire, which the God of the universe, our Heavenly Father, with almighty power, infinite wisdom, and unfathomable love created for us. On what a grand, bold plan the Almighty architect wrought when he uplifted our mountains, fashioned our hills, moulded our valleys, and filled our Winnipiseogee with its hundred or more square miles of water, and placed its beautiful basin higher above the ocean's level than the summits of Egypt's loftiest pyramids. Then contemplate how from its lofty height the overflow of its pure waters in the joyous leaps of their eager rush to the mother ocean, as in youthful frolic and

sport, turn the wheels to card, spin, and weave more cloth than could all the ladies in our State, or than does any other of the rivers of the world! The more we study and improve our State, the more shall we love her, and the more appreciate the goodness and wisdom of her builder. Earth's solid frame is a rough rock. Down from the north pole came the irresistible ice-plow of incomprehensible weight and incalculable power, grinding off the grit from which the sterling men of our State are made, and from the finer flour of which the bodies of our ladies are produced. Where, oh! where, on earth is there a better place to rear noble men and women than in New Hampshire? What State has ever surpassed her in this respect? Situated upon the sunny side of the midway line between the eternal ice of the north pole and the burning heat of the torrid zone, the Creator placed high on the mountain the image of a man, indicating that this was the place to rear him nearest perfection. How thankful we ought to be for our grand landscapes, our pure streams, our fertile vales, invigorating climate, and our healthful skies. Our lives are in the best period of the world's history, and our homes in a comparatively narrow belt which has produced the noblest men that earth has ever known. This narrow zone, in which it is our fortune to live, is the zone of the world's philosophers and poets, her scientists and artists, her patriots and statesmen. Strike out of the world's history the achievements of these men of the narrow belt, and what is left? Hence we see the wisdom of God in placing His Son in this, the man producing portion of the world.

Excuse me for repeating ideas I may have expressed before. Some truths, like the multiplication table, the ten commandments, and the sermon on the mount, ought to be repeated until they are familiar; and so, I think, ought some of the felicities of the closing year of the nineteenth century and of our native State.

Progress is our watchword; perseverance our motto; our improved method and improved farm-stock, our creameries and silos are but points indicating our advance. The future opens up in glorious vistas.

Our young or middle-aged may live to see an agricultural college in our State, with an annual income of a hundred thousand dollars and the world's best scientists in stock-breeding, and in feeding, and in all other departments of agriculture, teaching their sons and daughters. Oh yes, my brothers and sisters —

We'll make our hills with deeper verdure glow,
And our streams through richer meadows flow,
So that when the people learn our way,
Those who thought to scoff will come and pray.

Rev. George W. Patten, chaplain, made the following report:

REPORT OF CHAPLAIN.

BY REV. GEORGE W. PATTEN.

Worthy Master:

I have nothing of special importance to report in my department for the year just closing. I have made many visits to Pomona and Subordinate Granges, and have done my best to awaken an enlightened enthusiasm among our constituency; to arouse the dormant energies of the indifferent; and to strengthen and encourage the struggling Granges. Much more of this work is waiting and demanding to be done, in addition to the immense amount now accomplished by voluntary effort and private expense. I have no doubt but that the experience of every officer of this Grange coincides with mine, and that every one has had many more calls upon his time than he could answer, when the good of the order would have been undoubtedly promoted could he have responded favorably to the call.

But from the work which naturally gets itself done by those who believe in the holy mission of our order, the cause is prospering, and the master's report shows conclusively that the Grange in New Hampshire is in a live, healthy, progressive condition. The large majority of our members are intelligent, progressive, moral, and religious men and women.

Everything goes to indicate that they are increasing in those attributes of manhood and womanhood, and characteristics of good citizenship, mainly through the instrumentality of our meetings, our cooperation and good fellowship. The amount of good that is done, the intellectual instruction and stimulus imparted, the social life and friendly comradeship engendered by those meetings are beyond all computation. I believe in the grand functions of the church with all my heart, but I see more clearly every year that the Grange is doing a much needed work that the church cannot do. It is demolishing the walls of partition among the sects. It is connecting a bond of union between all forms of belief. It furnishes a neutral field in which those of the most diverse theological and political beliefs and affinities may learn together, and unite in all good words and works for the elevation of the race, the amelioration of business and social conditions, and the promotion of good citizenship.

In saying this, I do not forget, but would rather accentuate, what you have already so well said in your report, that both sectarianism and partisanship shall be kept rigidly without our gates. We know no sect or party here. But we *do* stand for religion—for that practical christianity which is love to God and love to man, and which takes the Golden Rule as its watchword. We *do* stand for that conception of politics which is as broad as the duties of citizenship, which is coincident with political economy, the services of government, the best methods of promoting a clean and efficient public life and official service. It is part of our business to see that just and equitable laws are enacted and honestly enforced and executed, without fear or favor. It is one of our most serious concerns that our politics be purified, that bribery and political corruption of every kind and sort be purged away at whatever cost or trouble. We, as an order, stand for all these good things, are working for them with all our united powers, and will never cease to labor and wait and pray for their speedy accomplishment and realization.

One word upon another aspect of the work of the Grange.

All that we can see or hear goes to prove that the degree work of our order is constantly increasing in efficiency and impressiveness. Every year Patrons are getting to appreciate the advantages of committing this work, which they are quick to see increases two-fold its beauty. May this good work go on till the rituals are as conspicuous for their absence as they are now for their presence. I need only to urge a little more attention to these details, a little more care in impressing on candidates the importance of keeping sacred and inviolate the secret symbols of the order, and a still greater effort on the part of all those in authority to extend the influence of our order, and bring all who are eligible within our hospitable gates.

Hon. J. M. Taylor, treasurer, made a report showing the finances of the State Grange to be annually improving. The amount of cash on hand was reported to be increased from \$2,400.40 December 17, 1889, to \$3,005.46 December 16, 1890.

REPORT OF SECRETARY.

BY N. J. BACHELDER.

Worthy Master :

We are again able to report a highly successful year for the Grange in New Hampshire, in fact, the most successful in its history, and without detaining you with preliminary remarks we will proceed at once to the statistical report. Subordinate Granges report quarterly to the State Grange, and the latest reports received are for the quarter ending September 30, 1890.

During the year ending September 30, 1890, there have been thirteen Granges organized as follows:

Tuftonborough, No. 142, Tuftonborough, Robert Lamprey, master.

Atkinson, No. 143, Atkinson, Herman Noyes, master.

Sunapee Mountain, No. 144, Goshen, Elias W. Pike master.

Pistareen, No. 145, Chesterfield, Winslow A. Partridge, master.

Pequawket, No. 146, Conway, Joel E. Morrill, master.

Richmond, No. 147, Richmond, Almon Twitchell, master.

Hooksett, No. 148, Hooksett, W. L. Rogers, master.

Granite State, No. 149, Newton, Enoch Seavey, master.

Junior, No. 150, Goffstown, G. F. Farley, master.

Meridan, No. 151, Plainfield, Josiah Davis, master.

Blackwater, No. 152, Andover, George W. Stone, master.

Honor Bright, No. 153, Sullivan, Charles W. Buckminster, master.

Fitzwilliam, No. 154, Fitzwilliam, Timothy Blodgett, master.

During the year two Granges have been reorganized :

Cornish, No. 25, Cornish.

Warren Pond, No. 47, Alstead.

Making 122 active Subordinate Granges, September 30, 1890, with a membership of 8,954.

The additions are from the following sources : By initiation — males, 593, females, 660 ; by dimits — males, 45, females, 40 ; by reinstatement — males, 36, females, 18 ; by charter members of new Granges — males and females, 383 ; members of Granges reorganized — males and females, 38 ; making a total gain of 1,813.

The losses are : By suspension for non-payment of dues — males, 175, females, 124 ; by dimits — males, 87, females, 87 ; by withdrawals — males, 23, females, 28 ; by death — males, 23, females, 24 ; making losses to the number of 571. This, deducted from the total additions, leaves a net gain of 1,242, and a total membership for the year ending September 30, 1890, of 8,954, as stated above. The largest net gain of any previous year was 982.

Since September 30, three Granges have been organized :

Merry Meeting, No. 155, Alton, Charles M. Downing, master.

Surry, No. 156, Surry, William H. Porter, master.

Trojan, No. 157, Troy, H. M. Whittemore, master.

Making the present number of active Subordinate Granges, 125.

The charter membership of these three Granges add 86 to the number, and with the probable net gain in the Granges of the State since September 30, our present membership cannot be less than 9,300.

Pembroke Grange, No. 111, stands at the head of the Grange column with 234 members.

Other Granges with a membership of 100 and over are as follows:

Amoskeag, No. 141, Manchester, 198 members.

Grafton Star, No. 60, Hanover, 174 members.

Thornton, No. 31, Merrimack, 173 members.

Cheshire, No. 131, Keene, 170 members.

Narragansett, No. 46, Bedford, 152 members.

Granite, No. 7, Milford, 145 members.

Harmony, No. 99, Sanbornton, 141 members.

Warner, No. 90, Warner, 141 members.

Uncanoonuc, No. 40, Goffstown, 138 members.

Souhegan, No. 10, Amherst, 135 members.

Friendship, No. 110, Northfield, 134 members.

McClary, No. 102, Epsom, 133 members.

Fruitdale, No. 106, Mason, 132 members.

Rochester, No. 86, Rochester, 122 members.

Hollis, No. 12, Hollis, 121 members.

Capital, No. 113, Concord, 114 members.

Loudon Surprise, No. 121, Loudon, 114 members.

Mt. Washington, No. 116, Whitefield, 112 members.

Winnipiseogee, No. 51, Meredith, 108 members.

Lebanon, No. 126, Lebanon, 107 members.

Rumford, No. 109, East Concord, 106 members.

White Mountain, No. 50, Littleton, 106 members.

Ashuelot, No. 129, Gilsum, 105 members.

Chichester, No. 152, Chichester, 103 members.

Merrimack River, No. 4, Canterbury, 100 members.

The number of Granges in this list has been increased from 22 to 25 during the year.

Fifty-seven Granges report a membership between 50 and 100.

Granite Star, No. 60, Hanover, has initiated 53, the largest number initiated by any Grange. Hooksett, No. 48, Hooksett, has initiated 52; and Great Meadow, No. 138, Westmoreland, has initiated 48. Atkinson Grange, No. 143, has made the largest percentage of gain, having increased its membership from 21 to 59.

One Pomona Grange has been organized during the year, Mascoma Valley Pomona Grange, No. 7, Charles McDaniel, master.

The Pomona Granges in the State are seven in number, with a membership as follows:

Hillsborough County, No. 1, 178 members.

Eastern New Hampshire, No. 2, 526 members.

Merrimack County, No. 3, 415 members.

Belknap County, No. 4, 204 members.

Northern New Hampshire, No. 5, 156 members.

Cheshire County, No. 6, 245 members.

Mascoma Valley, No. 7, 171 members.

The total membership of these Pomona Granges, September 30, 1889, was 1,614. The total membership, September 30, 1890, was 1,895, making a net gain of 281.

The gains and losses are as follows: By initiation — males, 128, females, 103; by dimits — males, 7, females, 7; charter members of Pomona Grange, No. 7, 149; total gain, 394.

The losses are: by suspension for non-payment of dues — males, 54, females, 34; by dimits — males, 3; by withdrawals — males, 11, females, 7; by death — males, 2, females, 2; total losses, 113; leaving a net gain of 281, as stated above:

Cash receipts for the year are as follows:

Cash returns for the December quarter, 1889 . . .	\$687.84
“ “ March “ 1890 . . .	790.85
“ “ June “ 1890 . . .	816.63
“ “ September “ 1890 . . .	793.60
Total receipts as per treasurer's report . . .	<u>\$3,088.92</u>

The receipts for the year ending September 30, 1889 were \$2,970.40, making a net gain in dues and fees during the past year of \$118.52.

Every Grange in the State is squared on the books of the State Grange to September 30, 1890.

The four Granges making the largest cash returns are located as follows :

Pembroke,	\$82.50	Hanover,	\$78.70
Manchester,	\$72.52	Merrimack,	\$55.40

The expenses of the office for the year have been as follows :

Postage	\$115.94
Printing and stationery	70.50
Office supplies and incidentals	91.57
Total expenditures	<u>\$278.01</u>

An itemized exhibit of the foregoing receipts and expenditures has been submitted to your executive committee, duly audited by them, and approved.

The Grange in New Hampshire has truly witnessed a year of remarkable growth and advancement. It is of a permanent character. There is still opportunity for extending its work, and let us legislate so wisely and work with such energy that the Grange will find an abiding place in every town in New Hampshire. This should be our goal, and with nothing less should we be satisfied.

E. C. Hutchinson, general deputy, made a comprehensive report giving the condition of the Subordinate Granges as reported to him by the district deputies and determined by visits in various sections of the State. C. H. Pettee, secretary of the executive committee, presented the report for that committee. The meetings were at Manchester, December 18, 1889; Concord, April 12, 1890; Concord, October 25, 1890; Manchester, December 16, 1890.

Reports of Pomona and Subordinate Granges by masters and

delegates were then called for. Fifty-four masters and delegates responded to the call, after which further reports were postponed until Wednesday morning.

Recess was then taken to meet in public session at 7.30 o'clock.

EVENING SESSION.

The meeting was opened with prayer by the chaplain, Rev. G. W. Patten. State Master McDaniel followed with brief remarks, stating that this occasion was one of the most joyous of the year, as we come together for the purpose of showing the progress and improvement made during the past year, which has been the most prosperous of any in the history of the Grange in New Hampshire, having gained in membership over one thousand two hundred. New Hampshire has done as well as could be expected, and her record for the past year is one to be justly proud of. If our young men had been at the session of the National Grange at Atlanta, and heard the reports from many sections of the West, and heard of the poverty shown by those reports, not another young man would be found who desired to go West; but instead all would be convinced that New England was good enough for the energetic young man, and that the only thing needed to make continued prosperity would be to stay at home and develop her agricultural resources, which would, in the near future, place her at the head of the nation as an agricultural community. He then introduced Master-elect E. J. Burnham, of Amoskeag Grange, who spoke as follows:

ADDRESS OF E. J. BURNHAM.

Worthy State Master, Patrons, and Friends:

It is with a sense of mingled pride and pleasure that Amoskeag Grange extends to you a cordial greeting on this occasion. You come as the worthy representatives of the organized farmers of New Hampshire. Prosperity has crowned your efforts during the past twelve months, and at no time in its

history has the order of Patrons of Husbandry been so strong and united in New Hampshire as it is to-day. The harmony that has prevailed throughout the Granges is an earnest of the spirit which will guide your present deliberations. Under such favorable auspices we welcome you to Manchester once again. It is one of the wise provisions of the fundamental laws of our order that only those who come fresh from a year's actual service in the Subordinate Granges shall take part in the work of shaping the course of the State organization for the coming year. With few, if any, exceptions you have, during the past year, stood at the head of your respective Granges. You have watched over their development; you know their needs; and now, with your faithful wives, you come to labor for their welfare in a broader field. You come fresh from the ranks of the active workers; you have marked the spirit of progress; you know the temper of the people; you have learned the watchword of the times. I hold that no other organization is, or can be, better equipped for the achievement of a definite purpose. But what is that purpose? There is a certain question as old as language itself. It was asked, I imagine, as long ago as when man first began to struggle and to think. The ancient Romans put it briefly when they asked, *Quem ad finem?* — To what end? We, in our expressive New England vernacular, repeat it by asking, "What is the use?" Never, perhaps, was this question more frequently or more derisively asked than of the Grange in its early days; and never was it more nobly answered than in the line so familiar to you all, — "To develop a better and higher manhood and womanhood among ourselves." This is the sum of true progress, and human experience has shown that progress is best advanced by association. There is an Eastern allegory which a scholarly friend of mine delights in telling. It is to the effect that human progress is retarded by a massive wall. It stretches across man's pathway from horizon to horizon. It is too high for one to scale it, too thick to be broken through. But if earnest hands will but press against it, it will yield — slowly, indeed, but always something may be

gained. It is the duty of every man and woman to help in moving on that mighty wall, and it has moved so slowly only because so few have done their part. Men and women, wrapped up in themselves, have selfishly stood aloof, ignoring the earnest workers, or scornfully asking, "What is the use?" But always, in all ages, some there have been who labored for the common good; and the wall has surely moved, albeit those who toiled might not mark its progress. And, so today, if the wall of progress is moving faster than ever before, it is because more have learned to work together. The individual sphere is expanding, homes are brighter on our hill-sides and in our valleys, communities are happier, life is better worth the living by reason of organized effort on every hand. And when the best shall have been achieved under the guiding hand of the Great Master of the universe, when for mankind Faith shall have ripened into knowledge, when Hope shall have blossomed to fruition, when Charity shall be spread as a mantle over all the earth, and when Fidelity shall have gained its full reward, it will be found that in the great work of human progress the Grange has borne a noble part through the united effort of willing hands, prompted by earnest hearts. With a promise to join you in the labors of the day, in her allotted station, Amoskeag Grange gives you a hearty greeting.

Response was made by Col. W. H. Stinson, Past Master New Hampshire State Grange.

RESPONSE BY PAST MASTER STINSON.

Patrons, Ladies and Gentlemen:

It is no easy task that falls to my lot to respond to the cordial greeting which has been extended to us. It is, indeed, gratifying to remember that of the seventeen annual meetings we have had, fifteen have been held in Manchester. The wonderful growth of the New Hampshire Grange during the seventeen years just past is phenomenal, and that from a mere

handful of members it has reached its present proportions is, to say the least, remarkable. The future welfare of the agricultural communities has been benefited by this association, and its beneficial effects deserve a place in the history of our State. "What is the use?" How often Brother Wason and I heard those words while canvassing the State in the interest of the Grange some years since. In Cheshire county we heard it the most, and to-day every town in the county, except one, has its Grange, and one town has two. This shows what a persistent, well-directed effort will accomplish, and the record shows that the words, "It's no use," did not prevail. We have been greatly benefited by the papers in the State, and the first paper to establish a Grange column and department was the "Manchester Union," which was interested through the earnest requests of Brother Burnham; and the help it has given our organization has been great indeed. Other papers have followed its lead, and now the press almost to a unit are in favor of and friendly to our order. All should contribute to the prosperity of your beautiful city; and I wish you prosperity in your Grange work, and may you never falter in well doing.

This was followed with a song by Sister M. Ella Huntress and Brother Fred Allen, of Amoskeag Grange. The song brought out rounds of applause from an appreciative audience, and they returned and sang another duet, "What happy, merry times we'll see."

In the absence of the mayor, who was compelled to be away on account of business arrangements, the following letter of welcome to the city was read:

OFFICE OF THE MAYOR,

MANCHESTER, December 16, 1890.

To Mr. McDaniel, Master State Grange:

DEAR SIR, — In response to your kind invitation, I should be most happy to be present to-night at the meeting of the New Hampshire State Grange and as chief executive of the city of Manchester to speak a word of welcome to its members; but an engagement, which makes

my absence from the city imperative, prevents. But you may be sure that my endorsement is not necessary to make you all welcome to our city. Our citizens are always glad to have the representatives of the farmers of the State visit us. We feel that it is good for us all to exchange ideas, and to learn more of the desires and needs of those of our people who are engaged in different pursuits from ours. Our merchants are especially glad to have you visit them, if not to buy, to examine the large stock of goods they carry, to learn their prices, and to see what business is really done in our city. We feel that Manchester presents unusual facilities for such meetings, in the railroad and hotel accommodations; and we are always glad when our opinions are justified, as they are by your selection of our city as the place of your meeting. I trust you will have a pleasant visit to Manchester, and will take a good look at her mills, her streets, her stores, her houses, and her people; and that you will be so well pleased that another year will find Manchester the unanimous choice of your members as the place of your meeting.

Respectfully,

D. B. VARNEY, *Mayor*.

The response was made by Past Master G. A. Wason, of the State Grange.

RESPONSE BY PAST MASTER WASON.

Worthy Master and Patrons:

No one regrets the absence of the mayor more than I do, as I well know the kindly welcome he would give us to this beautiful city which we have seen grow from the wilderness, as it were, to its present grand proportions, in a moment. Several of the veterans who were in Boston the past summer from the West were here on a visit, were shown about the city, admired the beautiful views to be had from our eastern hills, and then went to see the mills, which they examined from the foundation to the upper floor, and examined the various processes that the cotton went through during its manufacture, and they were filled with wonder at the great mills of Manchester, whose products are sent all over the globe, whose locomotives are traveling the iron all over the country, whose

board of trade has issued such an attractive pamphlet, describing Manchester's industries, that a boom will come greater than any in California; and I am afraid that my farm, only twelve miles out, will be staked out in building lots very soon. Only twice have the meetings of the State Grange been held outside of Manchester. Manchester is the only place that can sustain the State Grange. So, brothers, look around and get acquainted, and you will want to come to Manchester hereafter. There is great ground for hope. Let us live in hope, for half the towns in New Hampshire have Granges, and it is to be hoped that in the near future there will be a Grange in every town. The old cry that "farming don't pay," is dying out, and intelligent methods prove that farming does pay; for a farmer that I met in the northern part of the State received three hundred dollars for the potatoes that grew on one acre, and the price per bushel was forty cents. New Hampshire soil beats the West, and it is proven where intelligent labor and steady work are put into it. No one can say that farming does not pay and look over this intelligent audience. I hope that you progressive farmers will keep on until you have a Grange in every town along with your church and school. The main trouble with farming is, that the majority look too much to the dollars, and not enough for comfort. Now, Patrons, let us remember that we have as good a climate as any, that we have a free flag over our heads, and with the Grange banner in the lead there is no better place on earth than New Hampshire.

A duet was then sung, "Music at Nightfall," by Sister Wason, of Nashua, and Brother Rice, of Worcester, Mass. This song was greeted with very enthusiastic applause.

The next speaker was Brother B. P. Ware, of Marblehead, Mass., past master of the Massachusetts State Grange, who spoke as follows:

ADDRESS BY BROTHER B. P. WARE.

Worthy Master, Patrons and Fellow Farmers:

From what you have heard, you will see that by previous speakers the ground has been so admirably covered that there is little left for me to say. I congratulate you on your prosperity, and can say that while the order is not sectarian it is a religious order, and its first principles are those of christianity, and where it is a question of church or Grange, the broad principles of christianity as taught in the Grange accomplish, in many instances, what no church would have done. Without prosperity in agriculture we can have no national prosperity, for agriculture is the bone and sinew of the nation. The head of the agricultural department of our government has been raised to the dignity of a cabinet officer, and it was through the Grange that this was done. The farmers are protected by the Legislature and the outlook for continued prosperity is encouraging. Any reasonable request they ever may make of the Legislature will be granted. Whatever you may ask, see to it that the request is reasonable and just, and by so doing the Grange will be a powerful factor in benefiting the agricultural portion of the country. The Farmers' Alliance is an offshoot of the Grange, and its freshness is apparent in the demands it makes for legislation. I regret that the National Grange has recommended some of their wildcat schemes, and in this case they have slopped over, and I appeal to your conservatism to denounce these schemes and not be misled into these schemes of getting something for nothing. Necessity has compelled your great men to make the efforts which have made them famous, and it is necessity that will spur us on to success. I am glad to see so many here and to observe the interest exhibited at this meeting; nothing more is necessary than to keep on in the good work, and we will learn that "nothing succeeds like success."

The duet, "On Mossy Banks," was rendered by Brother Allen and Sister Huntress, after which His Excellency Gov.

D. H. Goodell was introduced. After the applause had subsided, Governor Goodell spoke as follows:

GOVERNOR GOODELL'S ADDRESS.

Worthy Master, Brothers and Sisters:

I am proud to stand here to-night and be able to say that I am a member of the Grange, and am pleased to learn of our great prosperity. The Grange seems to be on the boom. As everything in the country is booming, we are glad to learn that the boom has reached the Grangers of New Hampshire. The cry that "farming don't pay" is not true, and the present progress in agriculture is in a measure due to the grand educational work of the Grange. The deposits of our savings banks in New Hampshire have largely increased during the past year, and the increase is mostly in the farming communities, where the rate per capita is more than double what it is in the cities and large towns. It is said that the farmers are the bone and sinew of a nation. We farmers of New Hampshire are the backbone of the State, as well financially as in brain and bone. The farmers of New Hampshire are more well-to-do than any other class in the State, and I have found by all observations that I have been able to make, that it is safer and better to invest our capital at home and boom our own towns. The work of taking up the deserted farms in the State is progressing rapidly; over 300 of these deserted buildings are now inhabited, and soon the deserted farm in New Hampshire will be a thing of the past. Never has this State been so prosperous as during the past year, both in farming and in manufacturing, and we must advertise our success and keep up the boom.

Hon. G. Byron Chandler, of Manchester, member of the State Forestry Commission, was then introduced, and spoke as follows:

ADDRESS OF HON. G. BYRON CHANDLER.

Worthy Master, Ladies and Gentlemen:

The lateness of the hour warns me not to speak at much length on this subject of forestry, which is one in which I am deeply interested. I will say that if the Grange had been organized and in as flourishing condition as now, some thirty years ago, I should probably have stayed on the old farm in Bedford; for I was born and brought up on a farm, where, if I had stayed, I should have hoped to make a success of it. We have but little done in this country, as regards forestry, compared with what has been done in that line in Austria and other sections of Europe, but we will look at the intrinsic value of our forests. Formerly the chief value was for wood, and the custom was to cut down everything and clear the ground. The day for the market value of wood as a source of profit is gone by, and we hope to have the small growth left when a lot is cut off; and this by its growth will soon create another forest. I hope to see the time when we shall have a competent forester employed to look after this matter. I have great enthusiasm for this State, and hope I may always live here, and that when I die it may be beneath the skies of New Hampshire.

State Lecturer J. D. Lyman then said, —

Worthy Master and Patrons:

I bought an acre of land twenty years ago for three dollars, and have given a man forty dollars' worth of wood, and the land is worth sixty dollars to-day. Now, go right home, say your prayers, and go to bed.

The public session was declared closed, and after a brief secret session the Grange was closed in form to be again opened at 9 o'clock A. M. on the following day.

SECOND DAY.

The Grange assembled at 9 o'clock and was opened in due form. The committee on credentials reported the presence

of twenty-four additional members, after which the following list of standing committees was announced :

STANDING COMMITTEES.

Division of Labor and Master's Address. — W. D. Tuttle, East Andover, chairman; Amos Fletcher, Nashua; Andy Holt, Lyndeborough; F. M. Davis, Hancock; Mrs. Isaac Newton, Acworth; Mrs. F. H. Weld, Cornish.

Finance. — J. S. Freeman, Lebanon, chairman; Lowell T. Mason, Canterbury; G. D. Armstrong, Amherst; J. W. White, Derry; Kimball Webster, Hudson; F. H. Weld, Cornish; Mrs. W. U. Carlton, Goffstown; Mrs. C. W. Bedell, Littleton; Mrs. J. E. Shepard, New London.

Good of the Order. — T. E. Hunt, Gilford, chairman; W. S. Keith, Milford; Erastus Reed, Claremont; W. P. Farley, Hollis; Isaac Newton, Acworth; S. H. Abbott, Wilton; D. W. Burnham, Greenfield; J. G. Reed, Merrimack; Mrs. C. T. Mason, Canterbury; Mrs. M. F. Hill, Washington; Mrs. Andy Holt, Lyndeborough.

Resolutions. — J. E. Shepard, New London, chairman; J. D. Lyman, Exeter; M. E. Osborn, Peterborough; C. H. Dimick, Lyme; T. J. Courser, Warner; T. S. Pulsifer, Campton; T. O. Taylor, Sanbornton; G. W. Stone, Andover; Mrs. Erastus Reed, Claremont; Mrs. G. D. Armstrong, Amherst; Mrs. D. W. Burnham, Greenfield; Mrs. H. O. Hadley, Temple.

Coöperation. — L. F. Batchelder, Tilton, chairman; G. F. Mills, Dunbarton; G. E. Anderson, Londonderry; C. P. Farley, Bedford; J. F. Dickey, Alstead; F. H. Clough, Lancaster; R. A. Moore, Monroe; G. W. Fisher, Boscawen; Mrs. H. C. Felch, Bradford; Mrs. D. H. Tufts, Strafford; Mrs. Charles McDaniel, Springfield; Mrs. D. S. Woodman, Strafford.

Transportation. — James Davis, Gilsum, chairman; C. W. Bedell, Littleton; R. T. Gould, Hopkinton; H. C. Felch, Bradford; David Noyes, West Canaan; Albert Stevens, Canaan; F. W. Flint, Hillsborough; Mrs. Alvin Davis,

Canaan; Mrs. G. H. Towle, Deerfield; Mrs. W. D. Tuttle, East Andover; Mrs. T. J. Courser, Warner.

Publications.—M. F. Hill, Washington, chairman; Alvin Davis, Canaan; H. M. Worthley, Hebron; D. S. Woodman, Strafford; M. L. Lord, Dover; Mrs. T. O. Taylor, Sanbornton; Mrs. W. W. Burbank, Webster; Mrs. B. C. Brockway, Newbury.

Education.—G. H. Towle, Deerfield, chairman; G. M. Springfield, Rochester; C. A. Fowler, Sutton; W. W. Burbank, Webster; F. T. Collins, Gilmanton; Mrs. J. H. Tripp, Epsom; Mrs. W. L. Fiske, Dublin; Mrs. M. C. Stone, Swanzey; W. L. Rogers, Hooksett.

Agriculture.—J. M. Carr, Wilmot, chairman; J. H. Tripp, Epsom; B. F. March, Mason; H. P. Blake, Hill; Wallace Burleigh, Franklin; J. E. Frye, East Concord; George Farr, Littleton; Mrs. J. B. Corliss, Laconia; Mrs. R. B. Foster, Loudon; Mrs. C. H. Barnes, Walpole.

Mileage and Per Diem.—Lucien Thompson, Durham, chairman; M. C. Stone, Swanzey; W. H. Parker, Whitefield; F. A. Badger, Belmont; C. S. Hodgdon, Barnstead; J. B. Corliss, Laconia; C. H. Barnes, Walpole; Mrs. F. J. Lawrence, Jaffrey; Mrs. G. J. Bennett, Westmoreland; Mrs. F. C. Hamilton, Chesterfield.

Constitutional Amendments and By-Laws.—Oliver Drake, Chichester, chairman; J. R. Farnham, Marlborough; R. B. Foster, Loudon; A. K. Roberts, Tuftonborough; Mrs. James Davis, Gilsum; Mrs. Almon Twitchell, Richmond; Mrs. A. K. Roberts, Tuftonborough.

Claims and Grievances.—D. W. Rugg, East Sullivan, chairman; C. W. Farwell, Keene; S. J. Swallow, Rindge; G. J. Bennett, Westmoreland; Adam Dickey, Manchester; Mrs. G. W. Stone, Andover; Mrs. Timothy Blodgett, Fitzwilliam; Mrs. G. F. Farley, Goffstown.

Dormant Granges.—W. U. Carlton, Goffstown, chairman; G. S. Kingsbury, Nelson; L. T. Haley, Wolfborough; Fred J. Lawrence, Jaffrey; Robert Lamprey, Tuftonborough; Mrs. C. W. Emery, Canterbury; Mrs. T. E. Hunt, Gilford; Mrs. D. W. Rugg, Sullivan.

Trials and Appeals. — Herman Noyes, Atkinson, chairman; Perley Lear, Goshen; Almon Twitchell, Richmond; Enoch Seavey, Newton; C. H. Downing, Alton; F. E. Nesmith, Surry; Mrs. C. S. Hodgdon, Barnstead; Mrs. Lucien Thompson, Durham; Mrs. T. S. Pulsifer, Plymouth.

Unfinished Business. — D. R. Wyman, Concord, chairman; F. C. Hamilton, Chesterfield; G. F. Farley, Goffstown; H. W. Woodbury, Sullivan; Timothy Blodgett, Fitzwilliam; Mrs. G. W. Fisher, Boscawen; Mrs. G. F. Mills, Dunbarton; Mrs. C. A. Fowler, Sutton.

SPECIAL COMMITTEES.

Taxation. — C. H. Pettee, Hanover, chairman; W. L. Fiske, Dublin; V. C. Brockway, Newbury; Harvey Jewell, Winchester; C. W. Emery, Canterbury.

Music. — F. W. Prichard, New Ipswich, chairman; E. K. Jewett, Milford; J. M. Hayes, Dover; Mrs. C. W. Farwell, Keene; Mrs. M. E. Osborn, Peterborough.

The following telegram was received and greeted with enthusiastic applause:

LEWISTON, MAINE, December 17, 1890.

Charles McDaniel, Master N. H. State Grange:

The Patrons of Maine in their seventeenth annual session, five hundred strong, send greeting to their Brothers and Sisters in New Hampshire.

RUFUS PRINCE,

Master Maine State Grange.

The following response was sent:

MANCHESTER, N. H., December 18, 1890.

Hon. Rufus Prince, Master Maine State Grange:

Your fraternal greetings are enthusiastically received. Please accept ours in return, representing nine thousand New Hampshire Patrons.

CHARLES MCDANIEL,

Master N. H. State Grange.

Election of member of executive committee was then made, resulting in the choice of Brother Daniel W. Rugg, of Sullivan, for the constitutional term of two years.

On motion, the master's address was referred to the committee on Master's Address and Division of Labor.

On motion of Brother Pettee, the reports of secretary and treasurer were referred to committee on Finance.

A cordial invitation was extended to the State Grange and visiting Patrons, by Amoskeag Grange, to meet them at a banquet at their hall, at 5 o'clock this afternoon.

The Grange was declared at recess, until 1.30 o'clock P. M.

AFTERNOON SESSION.

At the expiration of the recess, the Grange reassembled, and the work was continued.

The hour of special assignment having arrived, namely, the exemplification of degree work, the first and second degrees were conferred by Granite Grange, No. 7, of Milford.

The work was performed in an exceptionally fine manner, and was followed by various questions on the unwritten work and the imparting of the new A. W. by the worthy master to masters and delegates of Subordinate Granges.

On motion, a vote of thanks was extended the officers of Granite Grange for the very able manner in which the degree was conferred. A vote of thanks was also tendered the choir for their services in this exercise.

The report of the special committee on taxation was then made by C. H. Pettee, chairman.

REPORT OF COMMITTEE ON TAXATION.

BY C. H. PETTEE.

Worthy Master and Patrons:

There are always radicals enough who are ready to tear away the foundations of all law; with these your committee does not desire to be classed. We think it wise, before pointing out any defects, to congratulate you and ourselves upon the

generally favorable status of our laws upon this subject, for we are in no such condition, as regards taxation, as are some of the other States in the Union. For instance, the Patrons of Pennsylvania claim that real estate in that commonwealth bears, on the average, a tax nine times as large as that levied on personal and corporate property.

The Legislature of New Hampshire has always contained a goodly portion of the farming element, and of others who are in sympathy with the masses. The results are seen in our generally just system of taxation. Progress naturally creates new conditions which necessitate changes in existing laws; moreover, weak points are occasionally developed which require strengthening.

Your committee would recommend but few changes in the fundamental system of taxation. We find, notwithstanding the constitutional prohibition of double taxation in our State, that the United States and state courts, on various pretexts, mainly resting on long usage and precedent, uphold a double tax upon certain forms of property, thus producing an injustice which legislation alone can remedy. To illustrate: Take the case of a mortgage. Suppose, on the first of April, that A has one thousand dollars in gold, B has the same, and C has a farm worth two thousand dollars. They are taxed on these several properties at a total valuation of four thousand dollars. Before the end of the year A purchases C's farm, paying his own thousand dollars in gold and B's thousand dollars which he has borrowed, giving as security a mortgage on the farm for the amount of the loan. With April comes the assessor, who finds that C, instead of owning the farm, is the possessor of two thousand dollars in gold; accordingly a tax is levied upon that. A holds the farm, and is taxed on its two thousand dollar valuation, while B is taxed for the thousand dollar mortgage he holds, making a property total of five thousand dollars. By this transfer, in some mysterious manner, there has been created for taxation purposes an extra thousand dollars, which it is evident does not exist.

To illustrate even more clearly, if possible, the evanescent

character of this extra thousand dollars. Suppose A and B had become equal partners in the purchase; then the assessor could have found nothing taxable excepting the *real* property, namely, the farm and the gold. This statement of the case is no fiction of the imagination, but has been long recognized by thoughtful writers.

Probably the strongest argument that can be advanced in support of the present system is the well recognized law that any system of taxation, if persisted in and enforced, will tend in time to distribute its business over the entire community. For example: if a special tax were levied on cobblers, so far as these workmen were able to add this to the price of their work the community would, of course, bear the tax instead of the cobblers. So far forth as the tax was paid by the cobblers themselves, the profits would be decreased, and only those who were satisfied with the lessened gains would continue in the business. If, however, fewer men took up the trade, increased patronage for these might again help to distribute the burden of taxation.

If our present law of taxation was uniformly enforced, it would, without question, largely regulate itself. But it does not follow, on the other hand, that the distribution made would prove beneficial to the State. As a matter of fact, we find that in its practical working the law acts to discourage borrowing and home investment. It is for this reason that your committee so strenuously recommend a change in the law. They would prefer to suggest a remedy which should cover all kinds of credits, but they find serious constitutional difficulties in going beyond the subject of mortgages. Inasmuch as nearly all credits may be put into the shape of mortgages, a remedy applicable to those would prove almost complete. We would therefore recommend the adoption, substantially, of the law which has worked successfully in Massachusetts for some ten years. Under it the mortgagee is made the owner of the property to the amount of the mortgage, for the purposes of taxation. By this change in the law, we should lose one per cent tax on about twenty millions of dollars, the

larger part of this being savings bank loans. The amount of this tax would, of necessity, be raised in other ways. Is it possible to supply the deficiency without an additional tax levy? This leads up to the question of the enforcement of existing laws.

According to the State reports for 1889, we have invested in New Hampshire savings banks some sixty-two millions of dollars, every dollar of which pays a tax, because of the strict supervision by state commissioners. Outside of these banks only eight millions worth of loans were reported for taxation. That this gives any fair idea of the amount loaned by individuals, no sane person will contend. For facts and figures to illustrate this opinion, we refer to the able speech of Hon. Samuel C. Eastman, speaker of the New Hampshire House of Representatives, delivered before the House, August, 1883. It is probable that were taxes generally paid on money loaned, no additional levy would be required to supply the deficiency occasioned by the suggested change.

We have at present an iron-clad law, which requires the tax-payer to take oath each year as to the truth of his inventory. This law is, however, often evaded.

After a careful study of its provisions, we have arrived at the conclusion that there is already law enough, if carefully enforced, to bring out a considerable portion of the tax, which in the past has been evaded. We do, however, think the laws governing the conduct of public officials concerned, need strengthening. At the least, there should be full publicity of returns, and any small number of tax-payers should have sufficient power to compel a delinquent assessor to perform his duty. We recommend such changes in the law as will bring about these results.

It is now quite generally recognized that there has been an over valuation of farm property, naturally following the depreciation which has been going on for many years. As this is a matter largely in the hands of the farmers themselves, it would seem that calling attention to it would be sufficient to rectify the injustice.

As a matter of fact, discussion has already brought about a partial remedy.

It is often claimed that certain forms of property are undervalued; without doubt some means might be devised to more nearly equalize valuations, and any proper legislation in this line should be welcomed.

Manufacturing property is most frequently referred to as being undervalued.

There is no doubt that assessors, to say nothing of the state board of equalization, do not make proper allowance for the difference in actual value of hazardous manufacturing properties, and those long established corporations whose stock remains fixed at a high premium for a series of years.

For example: we chance to know of a certain large corporation whose valuation has been based on the market rate of its stock. This was scaled down to seventy per cent to correspond, as was said, with other properties. In this case, it is thought by some, the market value of the stock does not fully represent the existing property, as there is on hand a large surplus; but, at any rate, the price of that stock is practically an auction rate, which needs very little, if any, scaling down in comparison.

Possibly some slight changes in existing laws would bring about an improvement, though an enlightened public sentiment would do more.

With reference to exemption of manufacturing property for a period of ten years, your committee would ask whether anyone can point to any single case where an exemption for six years would not have produced identically equal results as regards time and place of location. If not, the duty of the Legislature is plain, the time of exemption should be reduced.

We are aware, also, that there is a manifest injustice in compelling the whole State, and especially whole counties, to bear a share of the burden of exemption, especially as county taxes are usually largely increased by the presence of manufacturing centres; but we are of opinion that it is better to unite with the conservative elements of manufacturing towns,

in saving a whole four years' tax, than to antagonize this element in an effort to save a small fraction only through the whole of ten years.

In closing, your committee would recommend the following :

Resolved, That we favor such a modification of existing taxation laws as will prevent double taxation.

Resolved, That we recommend such legislation as will bring about a more thorough enforcement of present laws.

Resolved, That we favor a six year exemption law instead of ten.

Resolved, That we urge the Legislature, at its coming session, to give these matters earnest attention, in order to bring about a much needed reform.

Remarks were made upon the subject by Brothers Patten, Connor, and Webster.

On motion, the report was laid on the table for further consideration.

The worthy master appointed the following memorial committee on death of deceased members :

T. E. Hunt, Mount Belknap Grange.

G. W. Patten, chaplain, State Grange.

J. M. Connor, Union Grange.

R. A. Moore, Monroe Grange.

D. W. Burnham, Greenfield Grange.

F. T. Collins, Crystal Lake Grange.

Mrs. Isaac Newton, Cold River Grange.

Mrs. T. O. Taylor, Harmony Grange.

Recess was then declared until 7 o'clock.

During the recess the officers and members, and visiting Patrons partook of the banquet tendered by Amoskeag Grange. Over five hundred sat down to the well laden tables spread in the banquet hall of that Grange. The feast was replete with choice delicacies in such abundance as is seldom seen. Fine music was discoursed in the hall during the banquet.

It was the most extensive and elegant of all Grange banquets ever served in the State, and words fail to express the gratitude

and appreciation of those who were so fortunate as to be present.

EVENING SESSION.

The Grange assembled at 7 o'clock, and nine persons were instructed in the fifth degree, and the sixth degree was conferred in ample form upon one hundred and twenty-two candidates.

The report of the committee on Division of Labor and Master's Address was made by W. D. Tuttle, chairman.

REPORT OF COMMITTEE ON DIVISION OF LABOR AND MASTER'S ADDRESS.

BY W. D. TUTTLE.

Worthy Master and Patrons:

Your committee on Master's Address and Division of Labor offer the following report:

We have carefully considered the master's address, and regard it as an able and comprehensive document, well worthy the consideration of every Patron of Husbandry in New Hampshire. It treats of the leading agricultural topics of the day in a manner not to be misunderstood, and strikes the keynote for advancement all along the line. We recommend that the portion of the worthy master's address in regard to Juvenile Granges be referred to committee on Good of the Order; that portion in regard to education, be referred to committee on Education; also, that portion in regard to the College of Agriculture and Mechanic Arts, and to the Thompson will, to the same committee; that in regard to agriculture, to the committee on Agriculture; the part regarding constitutional amendments, to committee on Constitutional Amendments and By-Laws; that portion relating to the press, to the committee on Publications; the articles in regard to deputy inspection work, State Grange Fair, and fire insurance, to the committee on Good of the Order. We would also recommend that the portion of the address relating to deceased members of our order be referred to a special memorial committee.

The following telegram was greeted with applause :

WORCESTER, MASS., December 17, 1890.

Charles McDaniel, Master N. H. State Grange :

Your fraternal greetings received at the hands of Past Master Ware. A thousand Patrons of Massachusetts send cheers, and bid you God-speed in your work.

N. B. DOUGLASS,
Master Massachusetts State Grange.

The following letter from Hon. C. E. Tilton was read by the secretary, and referred to the committee on Resolutions :

TILTON, N. H., Dec. 13, 1890.

N. J. Bachelder, Esq., Secretary :

MY DEAR SIR, — Your favor inviting me to be present at the State Grange meeting at Manchester, Dec. 16, is received. I thank you for the invitation. Previous engagements prevent my acceptance, though I should be pleased to meet you all there, for I feel much interest in your welfare.

New ideas are carried from your meetings to your farms, which tend to improve them, and improvement in your farms means better times, better schools, and better governments.

The Federal government is aiding in the education of your sons in a most substantial manner, giving to this State this year \$35,000 for agricultural schools, which sum will be increased by \$1,000 each year for the next ten years, until the State of New Hampshire will receive annually \$45,000 for agricultural and mechanical schools and colleges. This will afford nearly a free education to your children, if wisely handled.

You are aware of the Act of Congress passed last summer appropriating to each State \$15,000, to be increased by \$1,000 each year until the sum of \$25,000 is reached, which is thereafter appropriated annually to each State for the benefit of agricultural colleges established, "or which may be hereafter established."

I would suggest that no question before your meeting needs a more careful consideration than the question of how this money can be used to the greatest advantage of the farmers.

Have the results of the present Agricultural college been entirely satisfactory to you, or have they been commensurate with the expenditure of public funds for the college?

Now seems to be the exact time for the farmers of this State to determine as to the future status of their educational facilities. The new Federal appropriation has just commenced. The Legislature of this winter is to determine where and by whom the money is to be expended. Wherever it is sent, the future appropriations will go; for in two years from now so much will have been expended at the location that a change will not be deemed advisable.

I believe in giving our farmers' boys the widest educational advantages possible, for they are to be the bone and sinew as well as the brain of the nation.

Why not establish another agricultural college in the eastern or central part of the State, which would be easy of access to those who cannot well reach the extreme west of the State?

The new law mentioned permits such a course, and leaves it with the Legislature to apportion the money.

Your organization finds Tilton a convenient and pleasant home for your annual fair; centrally located and handy for all parts of the State. Is it not a good place for another agricultural college?

Arrangements could be made for at once furnishing recitation rooms for students until suitable buildings of its own were erected. Assistance could be had for providing the State with a proper farm for the college, and this new gift from the government will support it, while I feel sure that a large number of boys who cannot or will not go to Hanover would come to the new college.

As I have said, it is in the power of the Legislature to establish a second college, and you, being the parties in interest, can command the will of the Legislature if you will unite on a course to be pursued.

If the Grange wishes to make an effort in the direction I have suggested, I will second them before the Legislature and elsewhere.

A bill establishing a second college and taking with it the latest government appropriation can be prepared and presented to the Legislature. Supported by the farmers of the State it will become a law.

Kindly bring these thoughts to the attention of the meeting, where I hope they will be fully discussed.

Very truly yours,

C. E. TILTON.

Memorial services were then held in respect to the memory of the deceased members named in the master's annual address, after which, in token of further respect, the Grange was closed to meet again at 9 o'clock A. M. on Thursday.

THIRD DAY.

The Grange assembled at 9 o'clock, and after the transaction of considerable routine business Mrs. C. W. Emery of Canterbury, chairman of the committee on Woman's Work presented the following report :

REPORT OF COMMITTEE ON WOMAN'S WORK.

BY MRS. C. W. EMERY.

Worthy Master and Patrons :

Your committee are pleased that an opportunity is given to call your attention to the work done by the matrons of the Grange, and to a few of the many ways in which our grand organization may assist the sisters and daughters.

Our first thought goes out to the children. We feel that they have not received the attention in the past that is their due, and we earnestly recommend that this State Grange adopt the Ritual for Juvenile Granges.

If we wish the young members of our homes to assist in perpetuating our beloved order, we must educate the children to appreciate its beautiful teachings.

It seems to your committee that this auxiliary to the Subordinate Grange supplies a long-felt need.

It is well known to you all, that if a Grange is failing or has become too weak to stand alone, it is the sisters who prepare and administer frequent doses of fragrant coffee, hot oysters, and other edibles so essential to its recuperation. If a Grange hall is to be built, the matrons raise a large part of the funds. If a hall is furnished or an organ purchased, it is the sisters who cannot rest until the debt is paid. Almost invariably the sisters sustain the music, that element so essential to a successful Grange. If a choice literary programme is to be furnished, it is often some sister who gives the gems of the programme, the spicy paper, the delightful song, or the interesting and instructive essay.

Our New Hampshire roster shows that nearly forty per cent

of the lecturers and secretaries of the Grange are sisters; this means that nearly half of the work requiring accuracy, honesty, and business and literary ability, is done by women. The worthy general deputy testifies that whenever the sisters are doing this work the Granges are in a prosperous condition.

And yet, while the sisters are permitted to do all this, while theoretically they stand equal with the brothers, and while individual women are being benefited by this noble order, your committee feel that women, as a class, are not receiving the benefits of the organization to the extent that is desirable.

Our worthy master of the State Grange, ever ready to recognize the principle of equality, tells us in his unrivalled annual address, that "woman has an equal voice and vote, and is eligible to each and all offices in the Grange, from the highest to the lowest."

We have yet to see a bright sister's ability recognized in the State Grange by the honor of the chairmanship of the committee. Our representative officers are not counted worthy of invitation to grace the stage on state occasions.

But these are only trivial matters compared with the fact that we are not working for our daughters' welfare as we are for our sons'.

While we are all brothers and sisters, working hand in hand for the elevation of the farmer, for his advancement, mentally and materially, urging the needs of our boys, striving for an agricultural college worthy of the name, that shall enable its students to stand in the front ranks, nothing is being done directly for our girls, the future wives of New Hampshire farmers.

There are plenty of schools where they can learn the languages, mathematics, music, and all the so called higher branches; but no school where they can learn the chemistry of cooking, or the art of house-keeping, the making of the marketable cheese or gilt-edged butter, home sanitation, and mechanical arts.

We sincerely hope that, while you are carefully considering as to the best way to expend the bounty of the general govern-

ment, you will remember the educational needs of our girls. If our State is to receive its greatest revenue from the summer boarder, the art of cooking is more important than the art of feeding cattle and sheep, and home sanitation of vastly more consequence than veterinary surgery.

To us it seems that the women and girls of New Hampshire are as much in need of help in the house and dairy as all the men and boys in the field and on the farm. Compare for a moment, in your own minds, the requirements of the two spheres, and you will realize that, if only for the sake of the future farmers, a helping hand should be extended to the daughters. This aid should come from the Grange. We should open the doors of the agricultural college to the girls on equal terms with the boys; and we should see that chairs are established that the girls may learn those arts and sciences so essential to the perfect house-wife and successful farmer, and which cannot be learned in the other schools.

The admission of women to the college is of small advantage, unless their practical educational needs are met.

Kansas and Michigan are leading the way in this great reform; let the old Granite State take up the good work.

Remarks were made by Brothers Pettee, Jewell, and Watson, followed by the adoption of the report.

On motion of Brother Shaw, voted that a committee be appointed to present matters suggested in the report to the Legislature.

The following letter was received from Brother Mortimer Whitehead, lecturer of National Grange:

PATRONS OF HUSBANDRY, NATIONAL GRANGE,

OFFICE OF LECTURER, WASHINGTON, D. C.,

December 16, 1890.

Charles McDaniel, Worthy Master N. H. State Grange:

MY DEAR BROTHER, — A short, busy year has run away since I was with you at the State Grange, and all day I have been thinking of the many good sisters and brothers of your good Grange State who are gathering once again in annual session. While I will not be able this year to be with you in person, and meet face to face the many good

friends I have met in Grange meetings and by hospitable firesides, I wish to assure one and all that in spirit I am with you now, and desire to extend fraternal greetings across the rivers, valleys, and mountains that are between us. Our order has made grand progress during the year, and New Hampshire Patrons have reason to rejoice over their share of the harvest. Good, earnest work on the lines marked down in our "Declaration of Purposes," and a faithful adherence to all the laws and usages of the order *always* bring success. Wishing you a pleasant and profitable session and a bright and happy new year after the joys of Christmas-tide, I remain,

Fraternally,

MORTIMER WHITEHEAD.

The following resolution was offered by Brother James Davis, of Gilsum, and, on motion, was referred to the committee on Good of the Order.

WHEREAS, It is of the utmost importance to the welfare of our order that the "Unwritten Work" should be imparted by all deputies in a manner uniform and exact before all Granges; therefore, be it

Resolved, That the master of the State Grange be empowered to arrange for a meeting of the general and district deputies at some central point at the earliest date practicable, when the "Unwritten Work" and other matters pertinent to our order shall be carefully explained, and the necessary traveling and hotel expenses shall be allowed to all deputies attending.

Resolved, That, in view of the great importance of this work, the State Grange hereafter provide for the mileage and per diem of district deputies to the annual session of the State Grange, at which time the said meeting for special drill and instruction shall be held.

H. B. Holman, chairman of the committee on Experiment Station, made the following report, which was adopted:

REPORT OF COMMITTEE ON EXPERIMENT STATION.

BY H. B. HOLMAN.

Worthy Master and Patrons:

Your committee appointed at the last session of this Grange, to visit the Agricultural college and Experiment Station, beg leave to submit their report:

We are thoroughly convinced that the faculty of our College of Agriculture and Mechanic Arts are working in unison with our farming interests, and with the funds now at their disposal, will labor to give us an institution that will be an honor to the State, and on a par with similar institutions elsewhere. We have inspected the workshop connected with the mechanical department, and there find evidence of great skill among the students in the various branches taught. We believe this practical course to be of the utmost importance to all those studying to become agriculturalists. It must be evident to all who visit this department that the accommodations are entirely inadequate to the growing wants of the college; and we are satisfied that it would be of great advantage to the college, the Grange, and the State, that suitable buildings be erected to meet these wants.

On inspection of the work of the Station we find that the experiments spoken of in the report of last year are being continued, the results of which will be found in the bulletins issued from the Station. These bulletins can be had by applying to Professor Whitcher, and we earnestly recommend that they be carefully read and preserved for future reference.

Your committee have made a thorough inspection of the farm, and find under cultivation 110 acres, 10 acres of the same being sprout land, producing nothing before being plowed, and yielding this season at the rate of 20 tons of ensilage per acre.

A small portion of the same piece was planted with potatoes, and the yield was at the rate of over 200 bushels per acre.

Sixty acres are in mowing, cutting 90 tons of first and 25 tons of second crop.

Seventeen acres produced 325 tons of ensilage, mostly Sanford's sweet corn; 8 acres in four varieties of millet, averaging $2\frac{1}{2}$ tons per acre; total, 14 tons; the variety producing the largest yield being the German, which Professor Whitcher recommends to all farmers using the millets.

Six acres in winter rye, yielding 10 tons, cured for fodder to be fed in connection with ensilage.

Four acres of oats cut for ensilage, producing 15 tons.

One acre in oats and vetches, yielding 6 tons for ensilage.

One acre of Japanese buckwheat; yield, 40 bushels.

One acre of potatoes; yield, 175 bushels.

Ten acres pastured in a rotation experiment, and 2 acres in garden, etc.

In addition to this 110 acres, there is a young orchard of four acres just coming into the bearing.

The income from the farm the past year has been about \$2,500.

Since a year ago there has been added to the barn a wing designed to accommodate 54 head of stock up stairs, not including calves, and 7 below. This is one of the most needed improvements, and adds greatly to the looks as well as the convenience of the buildings. It is built in a thorough and substantial manner, having good drainage and ventilation. The design is to keep the bulls entirely separate and out of sight of the remainder of the stock, in apartments built for that express purpose on the lower floor. At the end of the cow stable are pens, which can be divided to any desired size by movable gates, for the use of calves, etc.

At the opposite end of the stable is a finely constructed silo of 125 tons capacity, all feed being conveyed to the stock on a car hung from overhead, and running from near the silo the entire length of the alley.

A creamery is being fitted up in the basement of the Experiment Station building with all the modern appliances for the manufacture of gilt-edged butter.

Your committee do not think it best to make a long report, by entering into the minute details of work at the college and station, but advise all who are interested in what is being done there to visit Hanover, assuring them that they will feel well paid for the time and expense.

L. F. Batchelder, chairman of the committee on Coöperation, presented the following report, followed by its adoption:

REPORT OF COMMITTEE ON COÖPERATION.

BY L. F. BATCHELDER.

Worthy Master and Patrons :

History teaches that ever since the foundation of the world coöperation has existed, it exists to-day, and that it should continue to exist there can be no question. Coöperation is not only necessary to success, but success in almost any undertaking, especially in any effort of organization, is a proof of coöperation, while failure generally results from the absence of this principle.

Coöperation implies intelligence, education, confidence, civilization, and social development.

Among its results are a higher order of intelligence, steadfast integrity, praiseworthy ambitions, and nobler purposes. To effect any good purpose in its fullest extent requires the coöperative action of all interested. For instance, to maintain and build up the cause of education, requires the coöperation of teacher, parent, and pupil. This is but a truism of universal application; it follows, therefore, that if agriculture is ever to receive a fair profit, if it is ever to be relieved of unjust burdens, these blessings must come through coöperation among those interested in the objects to be obtained, and in no sense is this coöperation more essential than in an educated ballot among those who follow the plow or wield the hoe. It is well known that before the Grange sprang into existence the farmers gave little or no attention to any interest save that of production.

During the long period anterior to the birth of the Grange, other classes were not idle in caring for both their general and special interests. As a natural consequence, our statute books are burdened with laws granting special privileges to special classes, and most generally at the expense of agriculture, the great wealth-producing class. To correct these abuses will require the earnest cooperation of those whose rights are thus infringed.

Education is, therefore, the important work of our order,

and education is but a corollary of coöperation. As we all know, some most important advances toward reform have been made during the two decades last passed. We can reflect with pride that almost all of these originated with our order, or resulted largely from public sentiment moulded by the Grange.

Your committee deem it unnecessary to enter into any extended report in rehearsing what has resulted from cooperation, or enumerating ways in which it should exist, believing it is a matter which is receiving the attention of the Grange and its Patrons.

One matter your committee wish to bring before the Granges of New Hampshire for their consideration, is the matter of double taxation, and also the matter of exempting property from taxation.

As is well known, a great deal of property in manufacturing places is exempt from paying taxes for a term of years. But taxes must be paid, towns and cities must have money for municipal purposes, consequently the farms are more heavily taxed and the farmers thereby are made to pay more than their proportionate share of the public expense. We believe the principle is wrong, and we are glad this matter, together with double taxation or taxing mortgaged property, has received, and is receiving the attention of the Patrons. It is a matter that can be properly discussed in Grange and agricultural meetings, and we urge such discussion and such coöperative action upon the matter as shall mould public sentiment in the way that shall call for the repeal of such unjust laws.

At the session of the National Grange, in 1888, the committee on Coöperation in their report offered resolutions favoring the establishment of retail stores, of a wholesale, purchasing, distributing, and sale agency in each State Grange jurisdiction, and of a wholesale jobbing house to be established by the wholesale purchasing agencies.

We would recommend a careful consideration of the matter embodied in these resolutions by the Granges of New Hampshire.

We believe that in the matter of buying and selling, and in many of the business affairs into which the farmers enter, they would be greatly benefited by a more complete coöperation.

We would also recommend and reiterate the sentiments and ideas expressed in the excellent report of the committee on Coöperation of last year. We believe that report worthy of the attention and careful consideration of each Patron. We wish to congratulate the Patrons of New Hampshire upon the continued success of the Grange Fire Insurance Company. To the Patrons of our State this company has given a cheaper rate of insurance and thereby has been a source of saving to them. The more coöperation we have of this sort, the better.

Certainly there is benefit and advantage in coöperation. There is advantage in it socially, intellectually, financially, and morally. History proves it, and the history of our order shows it. Therefore we say, let us study the important subject of coöperation and consider it in all its bearings.

Let us be in full sympathy with all sentiments and movements in favor of organization and coöperation in agricultural circles, and let us seek to give such movements a more rapid growth.

The Grange is an organization instituted for the benefit and advancement of the farmers. As such it has been of great value and interest to them. Its influence for good is being felt throughout our land. Its teachings and principles are making a nobler manhood, a more refined womanhood, and better citizens; and again we urge careful attention to and earnest consideration of this subject of coöperation. Work for the advancement of the principles of the order and all interests pertaining thereto, and let there be such coöperation as shall make the Grange in a fuller sense what it is, one of the best and purest of organizations, and an indispensable help to agricultural progress.

George H. Towle, chairman of the committee on Education, presented the following report :

REPORT OF COMMITTEE ON EDUCATION.

BY G. H. TOWLE.

Worthy Master and Patrons:

Your committee upon Education submit the following report:

Education—to cultivate the intellect, to deepen and perfect the character, to improve and exalt the entire man—is one of the central pillars in the edifice it is the purpose of our organization to erect. Upon this we build, not only for the present but for the future. Other aims and objects we may and do have, which may call for vigorous effort and high endeavor, which have to do only with the temporal and physical well-being of our fellow-man. These, in coming time, from changes of condition and circumstances so rapidly taking place in the evolution of society, may perish or be forgotten; but one mind raised from the depths of ignorance to the sphere of intelligence and wisdom, one beclouded and darkened soul, to whom the treasure-house of knowledge has been unlocked, can never perish or be forgotten, but must go on communicating the divine light it has received in ever expanding circles throughout an endless eternity.

We heartily endorse that portion of our worthy master's address in reference to education, and urge upon the Subordinate Granges the claims of our Agricultural college and the benefits that may be derived from a careful consideration of the work of our Agricultural Experiment Station. To promote, elevate, and strengthen every judicious agency for the education of the youth of our State should, in the future as in the past, receive our cordial and united support.

The facilities and advantages in our rural or agricultural towns, available for the proper education of our youth in our public schools, as compared with those secured to the youth of our cities and manufacturing centres, it is the purpose of this report to briefly examine. It may be well, in the first place to inquire as to the theory and fundamental principles upon which our public school system rests.

Where is the justice, equity, or necessity of the State assuming the prerogative of taxing all, whether they be childless or have children, for the education of all? The only answer that can be given for the assumption by the State of such authority, is that it has the undoubted right to perpetuate itself, and there is no dogma of statesmanship more indisputable, than that ignorance, with its associate vice, is the most terrible foe by which a free state can be assailed. A state may be overrun by hostile enemies, its public buildings and works of art demolished or destroyed, its treasures exhausted, and its population decimated, and if the intelligence and virtue of its citizens be preserved it will quickly recuperate itself; but let it be overrun and borne down by a flood of ignorance, and it can only rise by a slow and painful process of discipline and education.

It is clear, then, that the State is not only exercising its legitimate function, but is performing a sacred duty to all its citizens, when, by law, it lays its hand upon every individual, whether a parent or not, and commands him to contribute according to his means for the common defence—the repelling of the most dangerous foe of all popular governments—the education of the children, not his children in particular, but all children. All this is conceded by every Protestant. Catholics, I believe, dissent and claim that the right and duty of education belong to the church. Now, then, it follows that this high and responsible duty of the State should be administered impartially and equitably to every child of the State. It is clearly the duty of the State to secure to the youth of the farming towns as nearly as possible equal school privileges with those of our great manufacturing centres.

Ignorance and vice among the rural population is no less lamentable and inimical to the safety and prosperity of the State than among the residents of cities. The claim of the child in the remotest hamlet is as sacred as of that living in the very shadow of city hall in this metropolis.

If we turn to the report of the superintendent of public instruction for the year 1888, we find that the city of Man-

chester expended of the public funds, upon her public schools, \$62,000, or \$14.76 for each scholar; the assessment rates for schools in Manchester were only two and six tenths mills on a dollar. In the thirty-five towns in Rockingham county, outside of Portsmouth and Exeter, the school revenue amounted to only \$62,000, or \$7.50 per scholar; and the assessment rates reach two and nine tenths mills on a dollar. In Portsmouth there was expended \$28,000, or \$15.96 for each scholar; the assessment rates are not given. In Concord there were expended \$43,000, or \$15.26 for each scholar; and the assessment rate was nearly four mills on a dollar. Throughout Merrimack county the average amount expended per scholar was only \$8.14, and in the exclusively agricultural towns much less; while the assessment rates average about three mills on a dollar. In Keene the amount expended per scholar was \$12.07; in Dover, \$15.65 for each scholar. The amount expended upon each scholar in Belknap county was \$7.15; Cheshire county, \$9; Carroll county, \$5.97; and in many of the exclusively farming towns only from \$4 to \$5 per scholar. But we will not dwell upon these, to many, uninteresting statistics, but simply say that those we have given are fairly illustrative of the many we might adduce, and, in fact, all that there are bearing upon the subject. Nor is the enormous disparity in educational advantages as shown by the figures fully realized until we consider, in connection with them, the steadily increasing obstacle of a sparse population, rendering it necessary to maintain a large number of small and uninteresting schools; while in the large towns and cities the pupils are brought together in the most convenient numbers for thorough and systematic instruction, rendering it far more economical than it is possible in farming towns. And yet the figures show conclusively that throughout the State there is expended of public funds about double the amount upon the city boy or girl that there is upon the country boy or girl; and the assessment rates are no higher in cities than in towns. And under the rapid depreciation of value in farming sections there

can be but little hope of a change for the better in the near future. On the contrary, the present trend must continue while the present law remains, fixing the town as the political school unit.

A remedy was sought in 1885 by abolishing the district system, which had come down to us from the early part of the present century, for the town system. The district system had signally failed to supply the requisite school privileges to the thinly settled portions of our State. Will the present law supply the long-felt needs of our rural population? In 1886 the Superintendent of Public Instruction, in his report vindicating the change and urging its advantages, says: "We have become a manufacturing State, and the attractions of business have drawn our people into the villages and cities. Agricultural labor upon farms that have lost their primitive productiveness having ceased to be remunerative, our sons and daughters have gradually drifted away from the rural districts, leaving but few children and a reduced aggregate of taxable property. This is true as to school districts, and it is no less true as to whole towns; and the town system in no way remedies the difficulty." He says: "It will be no longer possible for a rich district, by squandering surplus funds upon a few pupils, to deprive all of the other scholars in town of a portion of their legitimate schooling. It will be no longer possible for the village child to secure thirty or forty weeks, while the boy or girl on the farm gets but ten or fifteen because he happens to live in a poor district. It will be no longer possible to limit a heavy tax-payer in a poor district to one half the schooling of a non-tax-payer in a rich one. * * *

The law requires an approximate equality of school privileges." Herein he congratulates the people and the Legislature that a very desirable and judicial gain has been made.

But it *is* yet possible for large towns to expend large sums upon their schools, and the pupils to secure thirty or forty weeks of schooling, while the pupils of a farming town are limited to ten or fifteen. It is yet possible for a heavy tax-payer in the town of Springfield, worthy master, to be limited

to less than half the schooling of the non-tax-payer in any city of the State. There is no approximate equality of school privilege in New Hampshire; nor can there be until the whole State is made the political school unit, dispensing the inestimable blessings of free public schools with impartial hand to every child in the State.

While the present system of expending school revenues remains, can we reasonably anticipate that our higher institutions of learning will flourish? that our normal school and Agricultural college will be filled by farmers' daughters and sons who have had no adequate school privileges? Is it any wonder that they are struggling to maintain a precarious existence after fifteen or twenty years' faithful and arduous labor by the professors and friends of these institutions.

A thorough reorganization of our public school system upon the recognized principles of justice to all and impartiality to none, would establish a free high school in every town, under thoroughly competent male teachers, in which every boy might be fitted for the Agricultural college. Such schools in our country towns would give an impetus to education, and inspire a *love* of learning that might fill the Agricultural college with earnest, eager students. Upon such a system of high schools the college might rest for support with confidence and security, and be the crowning ornament of a structure whose outlines were symmetrical, and whose foundations were securely laid in justice and equity.

There is another phase of this problem, which, to properly treat, would transcend the limits of this report; and yet from its importance, we do not feel at liberty to close without alluding to it. The public policy of our State, as outlined by His Excellency Governor Goodell and endorsed by the Legislature, is, that a strong and persistent effort should be made to stay the depopulation of the rural sections of our State by the proper use of all legitimate means at command. If my observations over a limited portion of these towns have not been misleading, there is no other cause operating so powerfully and continuously to depopulate these sections as the proper school

advantages of which these towns are unjustly deprived by the present policy of distributing the school *revenues*. It takes the best — the enterprising, middle-aged men and women with families. When the children reach the age that requires better school privileges to fit them for the struggle of life amid the tremendous activities of the age in which their lot is cast, the old homestead is sold or abandoned, and they go to the cities or larger villages. In this they are actuated by the loftiest motives and inspired by the most sublime sentiment that ever moved civilized man to dare and to do — the welfare of their offspring. In vain will be the effect of commissioners of immigration to secure a reoccupation of these abandoned farms by desirable citizens, until the cause which has led to their desertion is recognized and removed.

Remarks upon the subject of the report were made by Brothers Lyman, Connor, Woodman, and others, followed by the acceptance of the report; and it was ordered printed in the Journal of Proceedings.

James Davis, chairman of the committee on Transportation, reported as follows:

REPORT OF COMMITTEE ON TRANSPORTATION.

BY JAMES DAVIS.

Worthy Master and Patrons:

Your committee respectfully submit for your consideration the following items and hope they will meet your approval:

We would reiterate and recommend the adoption of the first eight items of the report of your committee on transportation of last year; and lastly, we think the time is ripe and the present an opportune moment for the executive committee to present and impress the incoming State Legislature with the necessity of taking some action looking to the appointment of a state commissioner, with the end in view that the State should take charge of highways, or more particularly our country roads.

It is a well known fact that one half of the annual tax raised to repair our hill roads is more than wasted, and some united action must be taken by the Patrons in order to keep our roads open in the summer, to say nothing of our eight months of winter.

Your committee are of the opinion that if one half of the money raised annually was used to pay interest on bonds issued by the State to the towns for purpose of giving the towns a large sum of money to be expended for permanent improvements of our road-beds, under the charge of competent state officers, good highways would be the result, and the towns could create a sinking fund and keep them in repair with the other half.

The old *party* and district school jealousies, that have run riot in the past, make it impossible for local authorities to do satisfactory work with the power that they have at their command, and, as they generally have new men in command every year, each one with an *idea* that he knows best how to repair roads, the results are three-gutter roads, one in the middle for water, and one on either side in spots for looks, with eight or ten-inch sluices from the top of the hills, and water-bars that not only destroy our horses and wagons but help to make mankind profane.

It is well known that New Hampshire has just entered upon an era of summer boarding and *money-making*, but we cannot expect to reap the full benefit of this *boom* unless we can have roads on which city people can feel safe and comfortable in their many excursions to our hill-tops.

Trusting this brief report will impress the minds of the executive committee in a manner that will be favorable to some action of the State.

J. M. Carr, of the committee on Agriculture, submitted the following report:

REPORT OF COMMITTEE ON AGRICULTURE.

BY J. M. CARR.

Worthy Master and Patrons :

Your committee beg leave to present the following report :

Feeling that the subject of agriculture is one of the utmost importance to our State and nation, and that something must be done for its upbuilding, and that before long; that the present depressed state of agriculture is due to the agriculturists themselves, is partly true, in that they have too long neglected having a voice in the legislation of our country, and in uniting for their mutual protection and advantage; the farmers need to be aroused to the fact that the only successful manner in which to deal with the corporations, capital, combinations, etc., that are controlling our country to-day, is to form a gigantic union of their own, to protect their rights and further their interests.

Your committee recommend that this be strongly urged during the coming year, and also the fact that farmers must be placed in our legislative bodies, in order that the farmers' interests may be protected.

In considering the matters of our state agriculture, let us first look at the soil, climate, and character of the State, and see what can best be produced; the principal wealth of New Hampshire is its forests, and their wide-spread destruction cannot be viewed with other than the greatest dismay by those interested in the agricultural wealth of our State.

That the forests have a great and beneficial influence upon the climate and soil is now acknowledged by all intelligent minds; and that removal is a great damage is obvious by looking at the reports from Germany and Switzerland, where the mountain sides have been rashly cleared, and where 300 years will be required to repair the damage.

New York has aroused to the importance of preserving her forests, and has set a wise example by purchasing large tracts in the Adirondacks for preservation, and entering upon forestry as a state business, employing a number of foresters.

That immediate action is needed in this direction is very evident to one who traverses our State; and your committee recommend the presentation of a petition from this body to the next Legislature to take action thereto.

The wool-growing industry forms no small part of agricultural production, our hills being the right place for sheep to thrive on, and sheep being the best stock for the hills.

Boussingault tells us that the value of sheep manure to that of ordinary barnyard manure is as 300 to 108, conclusively proving that sheep are the best stock for New Hampshire pastures; but from all parts of the State come such complaints of the depredations of dogs upon the flocks, that there seems danger of this industry dying out if something is not done to protect them. There have several instances come to our notice of sheep owners who have gone out of the business simply from this cause.

We believe that all branches of agriculture should be fostered by the State, as upon the welfare and prosperity of her people depends her strength; in pursuance of this we recommend the drafting and adoption by this body of a bill, to be presented to the next session of the Legislature, asking that all dogs running at large be muzzled from May first to November tenth. If such a bill can be passed, sheep can be kept in this State, in proportion of thirty sheep to each ten cows, as our pastures have much feed good for sheep that cows will reject, and the income from lambs and wool will pay well.

The low prices for all farm products leave but little margin for waste in any direction; and we would urge upon the farming population the necessity of condensing, and instead of working a large territory poorly, with great expense of hired help, to work less but better, and secure from one half well worked as much as was formerly secured from the whole.

Produce the best of everything. With the present low prices, we believe that a small quantity of superior quality is more profitable than a large one of medium quality.

Work in some special line. No person can be good at

everything, and the farmer is no exception. What that line shall be let each one's inclination, market facilities, soil, and climate determine.

The Experiment Station is a great advantage to the farmers, and should be encouraged in all possible ways; the farmers' attention should be called to it and its value will be more fully appreciated. In order that this may be done, we suggest that the bulletins be placed upon the lecturer's table of each Sub-ordinate Grange.

The grateful thanks of all the people of our State should be extended to our State Secretary of Agriculture for his efficient war upon oleomargarine and protection of pure butter.

Your committee have examined and heartily endorse the report of the state master referring to agriculture.

A discussion followed, participated in by Brothers Lyman, Pritchard, White, Varney, Freeman, Smith, Newman, Dimick, Jewell, Haley, and others.

On motion, the portion of the report relating to Forestry was referred to the executive committee, followed by the adoption of the balance of the report.

J. E. Shepard, chairman of the committee on Resolutions, reported as follows:

REPORT OF COMMITTEE ON RESOLUTIONS.

BY J. E. SHEPARD.

The committee on Resolutions beg leave to submit the following report:

Resolved, That in our opinion the general government ought *not* to go into the banking business to supply any particular class of the people or any institutions with loans, *either with or without interest*; but that it is the *duty* of the government to supply the people with a proper amount of sound currency.

Resolved, That a copy of the foregoing resolutions be forwarded to each member of Congress from New Hampshire.

Resolved, That we favor the acceptance by the State of the provisions of the Thompson will.

Your committee have carefully considered the letter of our friend, Hon. Charles E. Tilton, which has been referred to them.

While we are of the opinion that Tilton, from its central location, would prove an excellent location for a state agricultural college, and while we should prize most highly the counsel and assistance, naturally accompanying such location, of him who has already proved his friendship by many deeds, still we are strong in the belief that the State should take no action which should unnecessarily divide and weaken efforts to firmly establish agricultural and other technical education in the State.

The funds *furnished by the national government* are deficient to thoroughly equip one first-class college *in a manner satisfactory to Patrons and their sons*.

While we see in the provisions of the Thompson will great advantages accruing to the youth of the next generation, we have before us no practical proposition for the technical education of our sons during the next twenty years except through our present college at Hanover; therefore,

Resolved, That we heartily second the trustees and faculty of our college in their efforts to build up and equip a first-class Agricultural and Mechanical college which shall be a source of pride and gratification to all Patrons. We earnestly commend this to the young men of New Hampshire who desire a thorough technical education, and we pledge our support in its behalf.

Resolved, That we endorse the efforts being made by the Commissioner of Agriculture in calling public attention to the natural attractions of New Hampshire and to the best of our vacant farms, and ask the Legislature to make provision for extending this work, especially in the direction of making known the advantages of our State as a health and summer resort.

Resolved, That in a government founded upon the will of

the people, the far-reaching influence arising from the purchase of votes threatens the very existence of free institutions; and that in aid of the purity of elections and to secure an honest ballot, unaffected by bribery or intimidation, we favor the Australian system in its entirety, as with such modifications as the experience of the States where it has been adopted has shown to be an improvement on that system.

Resolved, That in the interest of the whole people we favor such legislation as tends to prevent the adulteration of food and drinks, and protect the community from fraudulent adulterations and the sale of commodities under any other than their true name; and we most earnestly support and urge the passage of the measure now pending before Congress known as the "Conger Lard Bill," or some similar measure.

Resolved, That we commend the faithful effort on the part of the State Board of Agriculture in enforcing the oleomargarine law, and request the board to continue constant in its enforcement.

Resolved, That we are emphatically in favor of temperance, the enforcement of the laws and the instruction of the youth in its principles.

Resolved, That we pledge ourselves to increased energy for the upbuilding of our noble order.

The following circular in regard to "Temple to Ceres" was read and, on motion, the matter was referred to the executive committee for action on the part of the State Grange, and to the various Pomona and Subordinate Granges of the State for consideration and action:

TEMPLE TO CERES.

To Masters of the State Granges:

WORTHY BROTHER, — Please have read the following to your Grange, also communicate the same to all Pomona and Subordinate Granges in your jurisdiction. Please appoint a committee of ladies to push this matter, and ask that similar committees be appointed in every Grange in your State.

TO PATRONS OF HUSBANDRY.

The National Grange Patrons of Husbandry, at its recent session in Atlanta, Ga., adopted a resolution appropriating twenty thousand dollars out of its permanent fund to be used in the erection of a Temple to Ceres, as a home for the order of Patrons of Husbandry, in the city of Washington. This sum to be available when the further sum of thirty thousand dollars shall have been raised by voluntary subscriptions.

The executive committee of the National Grange directed the undersigned to issue this circular asking voluntary contributions of faithful Patrons in erecting a suitable home for our grand order, which will worthily represent agriculture and our membership, and be a fitting testimonial of the estimation in which are held the services to American agriculture of the seven founders of the order of Patrons of Husbandry.

An appeal is hereby made to faithful Patrons and all friends of our order to contribute "a free will offering," so that there can immediately be erected a Grand Temple which will not only serve as a home for the Grange but the rental of which will produce a sum sufficient to permanently pay all the expenses of the National Grange, thus leaving the present income free to be used in the lecture field.

The plan adopted is to ask: Each State Grange; each Pomona Grange; each Subordinate Grange; each individual Patron; each Woman's Work committee, to contribute to this fund by furnishing bricks for the Temple.

As soon as practical each contributor (subscribing not less than \$1.00) will be furnished with a handsome lithograph, showing them to have contributed to so grand an object; and besides, the names of all contributors will be enrolled in the *Special Roll of Honor* to be preserved in the Temple for all time, and published in such Grange papers as will contribute space therefor.

All committees on Woman's Work are requested to lend a helping hand in this noble work, to act promptly so that the work can be completed without delay.

Bricks will be sold at one dollar each. Books with bricks

for enrolling names and full instructions will be supplied on application.

All money should be sent as fast as contributed to John Trimble, Secretary National Grange, P. of H., 514 F street, Washington, D. C., who will deposit the same in the Fiscal Agency, where it will draw interest until a sum sufficient is secured to begin the work.

A building of this character will give dignity and position to our order and advance the material welfare of agriculture far beyond the cost; and it is earnestly hoped that every Grange and every member of the order will give of their means liberally, not grudgingly or of necessity, but with cheerful hearts and willing hands, aid in the proposed plan, to show to the world and to our national legislators that what other societies do in this direction can be done as cheerfully and on as grand a scale by the farmers of America.

For bricks, information, etc., apply to

X. X. CHARTTERS,

Box 33, Washington, D. C.

Brother Stinson offered the following:

WHEREAS, The cordiality of the welcome in so many ways accorded the State Grange at this seventeenth annual session by Amoskeag Grange of Manchester and for the fifteenth time in the history of the State Grange, must come home to each and every Patron; and,

WHEREAS, It may be a pleasant token of our appreciation of the courtesies extended, to have our expression duly engrossed, to be transmitted by the Secretary to Amoskeag Grange for their reminder; therefore,

Resolved, That the New Hampshire State Grange hereby place on record the deep sense of fraternal recognition they fully realize as due Amoskeag Grange for the reception and attention so heartily evidenced by these hall decorations, the eloquent words of welcome by their representative, Brother Burnham, and the sumptuous, rich, and finely served banquet, replete in all details, furnished by the accomplished sisters, of which we so enjoyably partook, and which renders this act of the State Grange but a slight assurance of the appreciation felt unanimously for these many acts; and may prosperity and fraternity

ever float from their standard in the onward and upward march of the Grange, thus contributing to the continued welfare of our *grand* order in the old Granite State.

Worthy Chaplain Patten spoke as follows :

Worthy Master :

I cannot let this occasion pass without attempting to voice more fully the feelings and sentiments of this Grange in regard to the splendid hospitality extended to us by the sisters and brothers of Amoskeag Grange, culminating most appropriately and charmingly in the banquet of Wednesday evening. We appreciate most feelingly the honor done us. We appreciate, as only hungry Patrons can, the profusion of good things provided for the comfort of the "inner man." We appreciate, as only civilized human beings can, the pleasing and appropriate adjuncts of table and banquet hall, and the delicate and efficient ministrations of the sisters, to whom we, as an order, are so conspicuously indebted. This sense of obligation is never absent from our hearts or our thoughts. We see evidences of woman's influence, tact, delicacy, and ability in every department and function and operation of any growing and progressive body. We become more conscious daily that without her wise and loving counsel, her inspiring presence, her deft touch, and kindly oversight, our order would lose enormously in that attractiveness and usefulness which are extending its beneficent influence from Maine to California, from the Atlantic to the great lakes. As we journey through life and note how large a part of existence is of a somber hue, and how much aid, comfort, cheer, encouragement come from woman's heart and hand, the words of Scott are often in our minds :

" O woman, in our hours of ease,
Uncertain, coy, and hard to please ;
And variable as the shade
By the light, quivering aspen made ;
When pain and anguish wring the brow,
A ministering angel thou."

What son can fail to do honor to the sex which furnishes the mothers of our race, and from which proceed all that is noble and best to humanity. "They naturally pour the wine and oil, Samaritans in every condition." From the profoundest and most honorable impulses of their hearts, our sisters pour out beneficence, healing, and Christian spirit to all within their reach; and no less profound and universal and influential in their nature is that impulse of hospitality to which we owe so large a measure of the success, the charm, and the ability of the Grange, and which furnished no insignificant part of the enjoyment and grand success of the banquet by which we have been honored.

The resolutions were enthusiastically adopted, after which the Grange was declared at recess until 1:30 o'clock.

AFTERNOON SESSION.—1:30 O'CLOCK.

The Grange reassembled, and, after due examination, was declared open for labor.

On motion, the report of the committee on resolutions was taken from the table, and the resolutions were severally adopted, followed by the adoption of the report of the committee.

The following resolution, offered by Worthy Chaplain Paten, was adopted:

WHEREAS, The memorial exercises are undoubtedly among the most important that claim the attention of the State Grange, and are due to the services and virtues of our departed sisters and brothers; and,

WHEREAS, Their influence for good is, or might be, incalculable upon our members, especially the young, and will incite us all to emulation as we dwell upon those excellencies which memory shall retain to bless us; therefore,

Resolved, That it is the sense of this Grange that time shall be devoted to these services by those who have the programme in charge, in full consonance with their transcendent importance, when there is a full convention and ample time for seemly and adequate consecration and reverent attention, and when our deliberations are not being constantly interrupted by departure from the hall and other distractions.

On motion, the report of the committee on Taxation was taken from the table and considered, resulting in the adoption of the report, except the clause recommending the reduction of the limit for which property may be exempted from taxation from ten to six years, which was laid on the table.

Report of the committee on Mileage and Per Diem by Lucien Thompson, chairman. Showed the number of miles traveled by the officers and members in attending the session to be 9,580; number of days' attendance, 478½; and total expense to State Grange, reckoning two cents per mile one way, and \$1.25 for each day's attendance, \$789.72. This was an increase over the previous session of 788 miles' travel, 5½ days' attendance, and \$22.62 in expense.

J. S. Freeman, chairman of the committee on Finance, made a report, followed by the report of the committee on Good of the Order, by Chairman T. E. Hunt.

REPORT OF COMMITTEE ON GOOD OF THE ORDER.

BY T. E. HUNT.

Worthy Master and Patrons:

Your committee on Good of the Order, in submitting their report, are fully aware of the fact that the subject is one of the greatest importance, and to consider all the topics that might suggest themselves would be beyond the time at our disposal. We cannot urge with too much force the supreme importance of keeping the Grange just what its noble founders designed it should be, a farmers' organization, pure and simple. This will require at all times, on the part of the Subordinate Granges, the utmost vigilance. The controlling element of political power which has been made manifest in the recent elections, now rests with the farmers of this country, and they are coming to assert the power and exert the influence to which their large numbers justly entitle them. Hence we believe it to be of the utmost importance to the future welfare of the Grange that the professional politician be excluded from membership in our order, "they have not

a sufficient direct interest in tilling the soil, but their whole interests are in conflict with our purposes."

We believe sounder advice never was given than that contained in the report of the committee on Good of the Order at the ninth annual session of the State Grange, of which our worthy master was chairman, when it said, "guard well the gates, that none may be admitted to membership on grounds of personal friendship, unless well satisfied that they are eligible, and in conforming to the requirements of our order will become worthy and respected members. Our safeguard is the "ballot," to prevent the unlawful and improper admissions.

We would also favor the policy of establishing a reading circle on the Chautauqua plan; we firmly believe much good would result, not only to those who took part, but to listeners as well. Each Grange could devote a part of each meeting to this exercise. If the Granges generally would adopt this, we believe that good results would follow. In the early history of the Grange, something of the kind was planned by Brother Thomas, secretary of the Pennsylvania State Grange, but, as far as we know, was not very generally adopted by the Granges of this State; the rapid growth we have attained since would seem to warrant that now was a proper time to start again.

We would earnestly urge all Patrons to connect themselves with the Pomona Grange, in whose jurisdiction they may reside; none can afford to remain outside this branch of our organization. Here, new and extensive acquaintances are formed, and the public meetings are of such a character that much can be learned and much good will result; but in order to obtain the highest degree of good in this direction, all must perform each and every part assigned them, there should be no excuses; let the programmes be prepared both in Pomona and Subordinate in advance for the year, then those placed thereon would have ample time to prepare their part, and thus the meetings would be made more interesting and profitable.

We also believe there should be a more earnest and thorough observance of Children's Day. We would suggest that the Grange coöperate with the board of education in their several towns, that all the children connected with the public schools may receive the benefits of this Grange festival.

In connection with the proper observance of Arbor Day, we would suggest to the Grange that if there are any neglected cemeteries in their midst, they devote a part of the day to beautifying these silent cities, great need of which we have seen in many parts of our State.

Your committee have carefully considered that part of the master's address in relation to Juvenile Granges, and unanimously recommend it be adopted by the Granges. We also most heartily endorse and concur in all that was said by the worthy master in his very excellent address in relation to deputy inspector's work, State Grange fair, fire insurance, and the Patrons' Relief association, and recommend these important auxiliaries to the careful consideration of every Patron.

We also recommend the adoption of the resolution offered by Brother James Davis, in regard to instructing the district deputies in the unwritten work.

Again do not let the purely social element so far predominate among us as to eclipse the main object of our organization. We believe that there is danger of this. Many an organization has run into this and from this into nothingness. Further, let us try to bring the attention of others to our beloved order and the truths it teaches.

M. F. Hill, chairman of committee on Publications, reported as follows :

REPORT OF COMMITTEE ON PUBLICATIONS.

BY M. F. HILL.

Worthy Master, Brothers and Sisters :

On receiving notice of my appointment as chairman of this committee, and realizing the importance of the subject to be

treated, a sense of my inability to do it justice almost forced me to decline the honor which attaches itself to the proper performance of the duties of the office, but remembering that our watchword is "try," concluded to do so.

Knowing that brevity is essential, I will commence by saying, what all admit, that in proportion to the intelligence possessed by a man or body of men will their success be measured. And here we would remind every Patron that we have been placed under very great obligations to members of the press and publishers of papers for the generous support accorded us by allowing us the free use of their columns, as well as the many proofs of their interest in the prosperity of our order.

We realize that our success has been largely due to this cause, and in return for such consideration we should lend them our cordial support and patronage.

Our worthy master in his report alludes to the importance of the press and publications as mighty factors in our work.

We fear that we often err in the selection of reading for ourselves and families, as there are so many papers from which to select. Perhaps it will not be out of place to mention a few of those which are doing a great and noble work for us, and in return should receive our support. The "Grange Homes" is supplying a need long felt as an advocate of our views as well as an honest exponent of right principles and true Grange doctrines.

Another, the "American Grange Bulletin," commends itself to all true Patrons by its manly and fearless advocacy of the right, regardless of consequences.

And yet another claims our attention. "Farm and Home" is an old favorite of the farmer's family and seems even better as it grows older.

And last, though not least only in price, will mention the "Farm Journal," published by our old friend Atkinson, dealing its stout blows for right against might.

Then at our very doors we have the "People and Patriot" and "Statesman," at Concord, the "Union" and "Mirror,"

of Manchester; all have come to be a household word in the farmer's family.

The above are only a few of the friends who have espoused the cause of the farmer and can rightly claim a share of the benefits resulting from our success.

And here let us remind you that all the above papers open their columns and invite all to write something of their own views on reports of farm operations, which will help to make the paper better and at the same time help to interest ourselves in all that tends to make life on the farm pleasant and profitable.

Taxation is, and will continue to be, a question of vast importance to our order, and we heartily endorse the action of the special committee.

We do not claim that we have been subjected to intentional wrong, but that while all other interests have been guarded, ours has been left, as it had no one to care for it, and the only blame we can place on them is that they have exemplified the first laws of nature regardless of the consequences to us.

As long as we have the power in our own hands to place agriculture on equal footing with the other great interests and fail to do so, we are subjecting ourselves to the ridicule of our opponents, and forging chains with which to bind our posterity to a fate even worse than our own.

As to the means by which we may be enabled to hold our own in the business world, none are so potent as the printed page, and, indeed, were it not for this, we should almost despair of ever having the ability to cope with the powers against us.

Let us, therefore, fit ourselves for the work before us by storing well our minds with such information as will be of use to us in the higher sphere opened to us through the influence of the Grange and kindred organizations.

We should bear in mind that we have less excuse than our fathers had for practicing a slipshod way of farming, as we are within reach of all the requisites to help us in our life work.

And again let me urge every Patron to lend his or her hearty support to all that tends to educate the masses, not only in agricultural lore, but in all the occupations which support our great and teeming population.

We feel it our duty to encourage every effort to extend the right of suffrage to the women of our country and will hail with joy the day when we shall welcome them, not only to our voting places, but to our halls of legislation as well.

In support of the above, allow me to mention a statement recorded by one of the greatest financiers known to our country, who had the oversight of the thousands of women employed in the treasury department, that not one cent was lost to the country through the dishonesty of a woman.

Before closing, allow me to express the hope that we shall strive continually to store our minds with knowledge, believing that therein lies our strength; as the times call for *vigorous* action, we enjoin all to work who never worked before, and all that have worked to work the more, and I will add a few lines which seem to voice my feelings in regard to our duty in this matter of such vital importance to all:

“ Men and brethren, up, be doing,
Help each other by the way.
Aid with heart and hand the dawning
Of a great and glorious day.

Think not earth has fixed teachers,
Progress centered in the few.
All men, more or less, are missioned,
Each one hath a part to do.

Let no heart be found to tarry,
Holy impulse bear you through,
All men, more or less, are missioned,
Each one hath a part to do.”

The report of the committee on Dormant Granges prepared by W. U. Carlton, chairman of the committee was read by the secretary:

REPORT OF COMMITTEE ON DORMANT GRANGES.

Worthy Master and Patrons :

The fact that you have a committee on Dormant Granges presupposes that there are such within the jurisdiction of this State Grange. After hearing the report of the secretary, deputies, and masters, one would be led to think that the appointment of such a committee was unnecessary, but alas, this is not the case. On inquiry, your committee find, we are sorry to say, a *few*, a very few Granges within our great Grange family, that are in this dormant or inactive condition — not dead but sleeping. We also learn that there are several that are dead, literally dead. In consideration of this fact your committee would make the following report :

We find, by the report of the committee on this subject in the preceding years, that the ground has been so thoroughly canvassed, and suggestions so judiciously and carefully made, that but little in that line remains to be done.

Your committee find on investigation that the few Granges that are dormant and those that are dead are not of recent organization, all were instituted before the year 1878, when the financial feature was the leading object; and their light grew dim or went entirely out as soon as that bubble burst. If our order was the only one that had these dormant members, we might well be alarmed and think the fault to be in the order itself; but an order based on such principles as ours, viz., faith, hope, charity, and fidelity, *cannot* reach such a condition unless wronged or neglected. We believe the great or leading cause of this dormancy is selfishness, a desire to be continually receiving good without dispensing it to others, being helped but not willing to help; a foul pond is one that has no outlet. Too many join the Grange simply to be entertained, with no intention or desire to help in the entertainment and benefiting of others.

Some have the “almighty dollar” so firmly implanted in their hearts that there is no room for the good things that the

Grange offers. There are too many of those so called beneficial orders where one can get, they say, \$500, \$100, or \$1,000 by paying only a few dollars, but experience has always taught that it is impossible to get something out of nothing; whatever one gains some one else loses.

The majority of Granges that are reported weak, are those in our small country towns, where to us it seems that the Grange should take the strongest hold; why this is so, we are unable to discover, except it be that the people are not yet educated up to the demands of the times and are ignorant of the fact that the Grange supplies this education. We are aware that the ever increasing number of other orders and organizations being instituted in all our larger towns, hinder, in a measure, the growth of the Grange, as there is a tendency to try every new thing.

The Grange must keep up to the times in all its work if it would hold its own with its competitors. No order has a higher motive or does a better work than ours, and we believe, with proper and persistent efforts, some of the weak Granges may be strengthened and awakened to newness of life and activity. We would suggest that some good speaker, with the ability and love for the work that Mr. Whitehead possessed, be engaged to visit such Granges, and by his energy, influence, and help, inject into them the "elixir" of life that shall once more put them on their feet and start them on the road to success.

If this is impossible, let the deputy, with some other good, live brother or sister, visit, enliven, and encourage them as the principles of our order demand. We also most heartily recommend frequent visits of neighboring Granges. Some Granges find a source of a great deal of pleasure and profit in surprises, going in a body and taking their lunch baskets with them, and thus affording their friends and themselves a most enjoyable picnic even in the winter evenings.

Care should be taken in the selection of officers; elect those that are qualified, have an interest in the work, and are willing to work. Do not elect any to office merely to draw them to

the Grange, first let them show themselves worthy of such confidence. The young people should be invited to come in and extra exertions made to induce them to abide with us; when they come, work should be given them to do, and do not be afraid of letting them have a good time, for on them, very soon, will the success of our order depend, and if they feel that they are useful and appreciated they will be sure to be interested and add much to the life of the Grange.

Work, in proper amount, seems to be the great panacea, not only by the officers but by the individual members; to gain strength in Grange, as well as physical life, no fruit is so delicious as that we have helped to procure. A few "Quaker meetings" will work injury and their effects cannot but be felt.

While we urge that efforts be made to revive our weak Granges, still, if a Grange has been allowed to decline and fall through sheer indifference among its members, we think the efforts needed to bring it to life and activity might better be expended in working in new fields and in organizing new Granges.

We suggest that state officers and deputies be awake to first indications of decline and take immediate steps to strengthen and help. It is a great deal easier to administer restoratives than to resurrect when life is extinct.

Report of committee on Music was presented by F. W. Prichard, chairman.

REPORT OF COMMITTEE ON MUSIC.

BY F. W. PRICHARD.

Worthy Master and Patrons:

There is nothing more essential to the growth and pleasure of the Grange than music; therefore,

Resolved, That it is for the interest of the Grange, State, Pomona and Subordinate, to have some better system or arrangement for

music in their meetings. Therefore your committee would recommend that the master and lecturer of each Grange have at each meeting a committee on Music, appointed to furnish either vocal or instrumental music for the next meeting; also, encourage each member of the order to assist in this part of the entertainment and all members that can sing to take part in the opening and closing songs; also,

Resolved, That the local Grange furnish music at all Pomona meetings.

Report of the committee on Constitutional Amendment and By-Laws was presented by Oliver Drake, chairman.

A vote of thanks was extended to the newspapers for reports of the session; to the railroads and hotels for reduced rates; to the city of Manchester for use of the City hall, and to various persons who had contributed to the furnishing and decorating of the hall for the meeting. J. S. Freeman offered the following, which was adopted:

Resolved, That the worthy master appoint a committee of three to visit the Agricultural college and Experiment Station, and report at the next session of the State Grange; also, a committee of three on Woman's Work in the Grange.

In accordance with the foregoing resolution, the worthy master appointed the following committee to visit the Agricultural college and Experiment Station: S. F. Merrill, Keene; George Farr, Littleton; W. U. Carlton, Goffstown.

On Woman's Work. — A. G. Marshall, Dunbarton; Annie E. Hutchinson, Milford; R. P. Davis, Gilsum.

Master McDaniel announced the following list of deputies:

General Deputy. — Emri C. Hutchinson, Milford.

Special Deputy. — Nahum J. Bachelder, East Andover.

District Deputies. — No. 1, George R. Drake, Manchester; No. 2, F. P. Wentworth, Rochester; No. 3, T. E. Hunt, Lake Village; No. 4, J. P. Blodgett, Hebron; No. 5, J. C. Morrison, Boscawen; No. 6, J. M. Carr, Wilmot Flat; No. 7, F. W. Prichard, New Ipswich; No. 8, T. H. White, Harrisville; No. 9, C. H. Rockwood, Swanzey; No. 10,

C. P. Farley, Bedford; No. 11, C. H. Dutton, Bennington; No. 12, L. L. Cutts, Newport; No. 13, J. S. Freeman, Lebanon; No. 14, William Harriman, Littleton; No. 15, Alonzo Towle, Freedom.

No further business appearing, the Grange was closed in due form at 4.30 o'clock.

N. J. BACHELDER,
Secretary.

LIST OF SUBORDINATE GRANGES AND THEIR OFFICERS, 1891.

No.	NAME.	LOCATION.	MASTER.	LECTURER.	SECRETARY.
1	Gilman.	Exeter.	John J. Bell.	C. W. Treadwell.	John D. Lyman.
4	Merrimack River.	Canterbury.	Lowell T. Mason.	Miss Lizzie F. Houser.	Miss Bertha E. Morrill.
5	Lovell.	Washington.	S. W. Hurd.	Mrs. Clara M. Hurl.	Mrs. Ida M. Brockway.
7	Granite.	Milford.	William S. Keith.	Miss Anna L. Colburn.	George W. Colburn.
8	Sullivan.	Newport.	Bela Graves.	George F. Whitney.	George W. Hurd.
9	Claremont.	Claremont.	Erastus C. Bailey.	Miss Anna L. Lewis.	Ora D. Blanchard.
10	Souhegan.	Amherst.	Harry A. Wilkins.	Mrs. Viola R. Dodge.	Henry C. Day.
11	Hudson.	Hudson.	Kimball Webster.	George H. Abbott.	Miss Gertie A. Merrill.
12	Hollis.	Hollis.	Roger Paul.	Mrs. Clara H. Marshall.	W. L. Marshall.
13	Nashua.	Nashua.	John L. H. Marshal.	Elijah A. Robins.	Mrs. Fannie A. Murch.
18	Pinnacle.	Lyndeborough.	William C. Wilder.	Mrs. S. Kate Swington.	John H. Goodrich.
19	Cold River.	Acworth.	Isaac Newton.	Miss M. J. Dickey.	Henry A. Clark.
20	Advance.	Wilton.	Stanley H. Abbott.	Willis H. Abbott.	Mrs. A. D. Abbott.
21	Prospect.	Mt. Vernon.	William H. Kendall.	Miss Eunice A. Fox.	Mrs. Annie E. Perham.
23	Greenfield.	Greenfield.	David Starett.	Mrs. J. Fletcher.	D. W. Burnham.
25	Cornish.	Cornish.	James W. Fitch.	Herbert Deming.	Mrs. Albert Weld.
31	Thornton.	Merrimack.	John G. Read.	Mrs. Cynthia A. Platts.	Miss Harriette McGilvary.
32	Oak Hill.	Francetown.	George D. Epps.	Edson H. Patch.	Emma J. Dunklee.
33	John Hancock.	Hancock.	Fred M. Davis.	A. Clifton Ware.	Miss Ella C. Ware.
34	Miller.	Temple.	Herbert O. Hadley.	Miss Helen M. Hadley.	George F. Barker.
35	Peterborough.	Peterborough.	Milton E. Osborn.	Mrs. E. Maria Hadley.	Mrs. Elsie E. Hunt.
36	Watic.	New Ipswich.	F. W. Prichard.	E. O. Marshall.	C. A. Preston.
37	Nutheld.	Derry.	Alvin J. Seavey.	Horace A. Hill.	Mrs. Lizzie F. Hill.
39	Bear Hill.	Henniker.	Arthur C. Graves.	Miss Julia A. Flanders.	Mrs. Charlotte A. Wilkins.
40	Uncanoonuc.	Goffstown.	William U. Carlton.	George Pattee.	Fred K. Hazen.
41	Wolf Hill.	Deering.	Dennis R. Chase.	Mrs. Calista J. Wilkins.	Mrs. Lizzie G. Locke.
42	Stark.	Dunbarton.	George F. Mills.	Mrs. A. G. Marshall.	Miss Ethelyn L. Jameson.
44	Londonderry.	Londonderry.	James G. Stone.	Mrs. Laura S. Dickey.	Henry J. Caldwell.

46	Narrangansett.	Bedford.	William F. Connor.	Mrs. Mary A. Gove.	Edward W. Stevens.
47	Warren Pond.	Alstead.	J. F. Dickey.	Mrs. Ira P. Smith.	Mrs. C. D. Smith.
48	Lancaster.	Lancaster.	Fred H. Clough.	Mrs. Louise E. Hartford.	W. R. Stockwell.
49	Monroe.	Monroe.	F. A. Blodgett.	W. I. Fisher.	R. A. Moore.
50	White Mountain.	Littleton.	C. W. Bedell.	George Walker.	Leslie F. Bean.
51	Winnepesaukee.	Meredith.	Fred H. Smith.	Arthur J. Mead.	Daniel L. Alexandria.
52	Mount Belknap.	Gilford.	Almon L. Sanborn.	Miss Isa M. Sanborn.	Perry E. Hunt.
53	Joe English.	New Boston.	George A. Wason.	Mrs. Mabel Buchanan.	Charles F. Marden.
54	Wyoming.	South Weare.	Almus W. Morse.	Eben L. Paige.	Mrs. Emma W. Nichols.
55	Ammonoosuc.	Bath.	M. R. Tewksbury.	John A. Noyes.	Dennis Lawson.
56	Union.	Hopkinton.	Robert T. Gould.	Mrs. Emma A. Foss.	Mrs. Catherine S. Connor.
58	Bradford.	Bradford.	J. Merrill.	Mrs. Eliza A. Merrill.	Mrs. Helen H. W. Felch.
60	Grafton Star.	Hanover.	C. H. Pettie.	G. W. Tarleton.	Miss C. C. Warden.
62	Morning Star.	Lyme.	Frank G. Whittemore.	Mrs. George P. Amsden.	George S. Mayo.
63	Valley.	Hillsborough.	John Goodale.	Miss Jennie Vickery.	Mark M. Hadley.
65	Crown Point.	Strafford Corner.	David H. Tufts.	Frank B. Yeaton.	Charles F. Foss.
68	Mascoma.	West Canaan.	David Noyes.	Julia A. Dwinels.	Ruth K. Jones.
69	Eureka.	Grafton.	George E. Whitford.	George S. Barney.	B. Franklin Williams.
70	Mont Calm.	Enfield.	Charles McDaniel.	George F. Pettengill.	Amos M. Bryant.
71	Blazing Star.	Danbury.	Kendrick S. Bullock.	Miss DeEtte L. Bullock.	Frank L. Taylor.
72	Indian River.	Canaan.	Alvin Davis.	C. O. Barney.	A. M. Shackford.
74	Deerfield.	Deerfield.	John L. Stevens.	Miss Alice J. Dearborn.	Arthur M. Chase.
77	Mount Hope.	Landaff.	John E. Hall.	Mrs. John E. Hall.	W. E. Clark.
79	Olive Branch.	Hebron.	George B. Barnard.	Hiram Worthley.	Ellen E. Rogers.
80	Bow Lake.	Strafford.	William A. Brown.	D. S. Woodman.	J. F. Hanson.
81	Cochecho.	Dover.	Hiram S. Osborn.	Mrs. L. P. Wentworth.	James M. Hayes.
83	Spafford.	(West) Chesterfield.	Rev. Hiram B. Morgan.	Mrs. Lenna S. Brown.	H. G. Smith.
86	Rochester.	Rochester.	Alvah E. Otis.	Frank P. Wentworth.	J. A. Corson.
87	Kearsarge.	Wilmot.	Fred W. Roby.	Mrs. Louisa M. Nelson.	Fred E. Longley.
88	Highland Lake.	Andover.	F. H. Flanders.	G. H. Haley.	Mrs. E. M. Tuttle.
90	Warner.	Warner.	Walter M. Flanders.	Miss Sarah Davis.	Miss Jennie S. Perry.
91	Sutton.	Sutton.	William H. Chadwick.	Mrs. Eliza L. Fowler.	Daniel L. Powers.
93	Campton.	Campton.	Thomas S. Pulsifer.	Walter H. Dow.	Mrs. Almira H. Merrill.

LIST OF SUBORDINATE GRANGES AND THEIR OFFICERS, 1891. — *Continued.*

No.	NAME.	LOCATION.	MASTER.	LECTURER.	SECRETARY.
94	Ezekiel Webster.	Boscawen.	George W. Fisher.	Mrs. Elvira P. Carter.	William P. Abbott.
95	New London.	New London.	Willie M. Knowlton.	Mrs. Lucia N. Shepard.	Edgar F. Sargent.
96	Forest.	Stoddard.	Albert B. Reed.	Miss Emma E. Cutter.	Miss E. E. Griffiths.
97	Catamount.	Pittsfield.	S. N. Lougee.	Mrs. Effie M. Sanborn.	Natt A. Cram.
98	Antrim.	Antrim.	George T. Buchanan.	Mrs. Nellie M. Hills.	W. C. Hills.
99	Harmony.	Sanbornton.	George H. Wadleigh.	Freeman D. Gilman.	George C. Ward.
100	Daniel Webster.	Webster.	Frank A. Lang.	Mrs. Mary C. Wadleigh.	Miss Annie P. Wadleigh.
101	Crystal Lake.	Gilmanton.	Frank T. Collins.	Luther E. Page.	Miss Harriet B. Cogswell.
102	McClary.	Epsom.	James H. Tripp.	Miss May E. Dollbeer.	Miss Annie M. Tripp.
103	Monadnock.	Dublin.	Fred C. Gowing.	Rev. George W. Patten.	Miss Sarah F. Townsend.
104	Bartlett.	Salisbury.	George P. Titcomb.	Charles A. Green.	John W. Folsom.
105	Silver Lake.	Harrisville.	Martin P. Mason.	Mrs. Anna M. Phelps.	Mrs. Mary F. Parker.
106	Fruitdale.	Mason.	Edwin S. Spalding.	George L. Blood.	Miss N. F. Thompson.
107	Pemigewasset.	Hill.	Henry P. Blake.	Frank R. Woodward.	Joseph W. Favor.
108	Franklin.	Franklin.	Elmer D. Kelley.	Lizzie A. Brockway.	Emma Burleigh.
109	Rumford.	East Concord.	John G. Tallant.	Miss Eulalia M. Lyle.	Frank P. Curtis.
110	Friendship.	Northfield.	Edwin D. Forrest.	Miss Annie F. Lane.	Miss Kate Forrest.
111	Pembroke.	Pembroke.	Charles A. Gile.	Charles B. Rogers.	Frank T. Cheney.
112	Sunapee Lake.	Newbury.	Virgil C. Brockway.	John D. Folsom.	Willis E. Muzzey.
113	Capital.	Concord.	Joseph E. Shepard.	Miss Mary E. Ballard.	Miss Lizzie Stokes.
114	Golden Rod.	Swansey.	Marcus C. Stone.	George Carpenter.	C. H. Rockwood.
115	Granite Lake.	Nelson.	Frank B. Hardy.	Mrs. Rose M. Barker.	Cummings B. McClure.
116	Mt. Washington.	Whitefield.	William H. Parker.	Mrs. J. A. Goodwin.	Mrs. C. E. King.
117	Lawrence.	Belmont.	E. G. Ladd.	Mrs. J. P. Gilley.	Mrs. Hattie A. Lamprey.
118	Marlbrough.	Marlbrough.	George L. Capron.	J. K. Southwick.	Almon C. Mason.
119	Barnstead.	Barnstead.	George W. Dow	Charles F. Davis.	Mrs. Calista M. Downs.
120	Laconia.	Laconia.	J. Frank Crockett.	Mrs. Eva Z. Sargent.	Leroy J. Severance
121	Loudon Surprise.	Loudon.	Rinaldo B. Foster.	George W. Rowell.	Clara A. Mudgett.

122	Scannell.	Durham.	Lucien Thompson.	Miss Mamie E. Young.	T. W. Schoonmaker.
123	New Hampton.	M. H. Merrow.	M. H. Merrow.	Miss Minnie M. Swain.	Mrs. Ella R. Merrow.
124	Star King.	Jefferson.	Lyman D. Kenison.	Mrs. Mary F. Applebee.	James G. Summers.
125	Walpole.	Walpole.	Charles H. Barnes.	Mrs. H. J. Watkins.	A. Dwinwell.
126	Lebanon.	Lebanon.	Fred P. Hatch.	Mrs. Cynthia Perley.	Mrs. Mary J. Berry.
127	Massabesic.	Auburn.	Henry C. Sanborn.	Willard H. Griffin.	Alfred D. Emery.
128	Lake Shore.	Wolfeborough.	Levi T. Haley.	Greenleaf B. Clark.	Jonas W. Piper.
129	Ashuelot.	Gilsum.	W. S. Mansfield.	Mrs. Fannie Smith.	Mrs. Carrie M. Kidder.
130	Ossipee Mountain.	Tuftonborough.	Charles J. Burleigh.	Albert A. Bertwell.	Mrs. Julia F. Pray.
131	Cheshire.	Keene.	Ellery E. Rugg.	Mrs. Maria J. Randall.	Solomon F. Merrill.
132	Chichester.	Chichester.	J. Frank Towle.	Oliver Drake.	N. D. Fitts.
133	Wantastiquet.	Hinsdale.	George P. Slate.	L. Frank Liscom.	Mrs. I. Janette Davis.
134	Marshall P. Wilder.	Kindge.	A. W. Gibson.	Jason S. Perry.	Martin L. Goddard.
135	Jaffrey.	Marlow.	W. J. Mower.	E. R. Spaulding.	Mrs. S. H. Chamberlain.
136	Excelsior.	Dalton.	James M. Perkins.	Mrs. Warren M. Davis.	Mrs. Perley E. Fox.
137	Riverside.	Winchester.	Bert A. Taylor.	Mrs. Etta Cushman.	W. L. Johnson.
138	Great Meadow.	Westmoreland.	Clement L. Mansfield.	James A. Craig.	George J. Bennett.
139	Arlington.	Winchester.	Harvey Jewell.	W. E. Johnson.	S. M. Morse.
140	Freedom.	Freedom.	Stephen W. Fowler.	Alonzo G. Fowler.	John E. Perkins.
141	Amoskeag.	Manchester.	E. J. Burnham.	Scott W. Lane.	O. H. Leavitt.
142	Tuftonborough.	Tuftonborough.	Robert Lamprey.	James A. Bennett.	Elbridge D. Copp.
143	Atkinson.	Atkinson.	Herman Noyes.	Truman B. Rice.	George E. Emerson.
144	Sunapee.	Goshen.	Elias W. Pike.	Jessal P. Gove.	Mrs. Stephen D. Moxham.
145	Pistareen.	Chesterfield.	Winslow A. Patridge.	Mrs. Ella L. Pierce.	Frank C. Hamilton.
146	Pequawket.	Conway.	John L. Pendexter.	Joseph L. Binford.	James W. Whitaker.
147	Richmond.	Richmond.	Almon Twitchell.	Mrs. Cora F. Martin.	Mrs. Lucy J. Freeman.
148	Hooksett.	Hooksett.	Warren Saltmarsh.	Arthur Kimball.	C. E. Nutting.
149	Granite State.	Newton.	Ezra N. George.	Miss Kate Dalton.	Irving M. Heath.
150	Junior.	Goffstown.	G. F. Farley.	D. G. Roberts.	Miss Carrie A. Tirrell.
151	Meriden.	Plainfield.	Josiah Davis.	Mrs. Marion Eastman.	Mrs. Hattie A. Hilliard.
152	Blackwater.	Andover.	George W. Stone.	Wendall P. Elkins.	Nathan Woodbury.
153	Honor Bright.	Sullivan.	Charles W. Buckminster.	O. H. Woodbury.	Mrs. Rue Finfield.
154	Fitzwilliam.	Fitzwilliam.	Timothy Blodgett.	Stephen A. Taylor.	D. F. White.

LIST OF SUBORDINATE GRANGES AND THEIR OFFICERS, 1891. — *Continued.*

No.	NAME.	LOCATION.	MASTER.	LECTURER.	SECRETARY.
155	Merry Meeting.	Alton.	Charles H. Downing.	Miss Mary E. Avery.	Mrs. P. H. Wheeler.
156	Surry.	Surry.	William H. Porter.	Mary E. Field.	John A. Weber.
157	Trojan.	Troy.	Henry M. Whittemore.	Charles W. Brown.	George W. Mason.
158	Mt. Israel.	Sandwich.	B. F. Fellows.	C. B. Hoyt.	E. W. Hodsdon.
159	Lincoln.	West Swanzev.	Park E. Wright.	James E. Handy.	Herbert O. Young.
160	Carroll.	Ossipee.	A. J. Hamm.	Lizzie L. Farnham.	J. C. Ames.
161	Jeremiah Smith.	Lee.	B. Frank Davis.	Frank J. Smith.	Horace F. Caverno.
162	Newfound Lake.	Bristol.	Calvin Martin.	George D. Judkins.	Woodbury Sleeper.
163	Hampstead.	Hampstead.	John C. Sanborn.	Mrs. E. L. Spinney.	Mrs. Albert H. Little.
164	Crescent Lake.	Barnstead.	William H. Berry.	Mrs. A. E. Chamberlain.	Lenore J. Holmes.

No.	NAME.	LOCATION.	MASTER.	LECTURER.	SECRETARY.
1	Hillsborough County.	Milford.	Elbridge K. Jewett.	Mrs. E. C. Curtis.	D. G. Roberts.
2	Eastern New Hamp.	Bow Lake, Strafford.	James H. Hayes.	Lucien Thompson.	Charles F. Foss.
3	Merrimack County.	Concord.	W. W. Burlbank.	H. H. Metcalf.	Mrs. Caroline F. Emery.
4	Belknap County.	Laconia.	Thomas E. Hunt.	Fred Smith.	Miss Millie F. Weeks.
5	Northern New Hamp.	Littleton.	George Farr.	Charles L. Clay.	George E. Walker.
6	Cheshire County.	Keene.	James Burnap.	Thomas E. White.	Mrs. Ella J. Farwell.
7	Mascoma Valley.	Lebanon.	Charles McDaniel.	Herbert L. Webster.	Alvin Davis.
8	Carroll County.	Ossipee.	Alonzo Towle.	C. E. Blanchard.	James A. Bennett.

LIST OF POMONA GRANGES AND THEIR OFFICERS, 1891.

NEW HAMPSHIRE GRANGE FAIR.

SECRETARY'S REPORT.

OFFICERS FOR 1891.

W. W. BURBANK, <i>President</i>	.	.	.	Webster.
WARREN TRIPP, <i>Vice-President</i>	.	.	.	Epsom.
G. H. WADLEIGH, <i>Treasurer</i>	.	.	.	Tilton.
N. J. BACHELDER, <i>Secretary</i>	.	.	.	Andover.

EXECUTIVE COMMITTEE.

W. F. DANIELL	.	.	.	.	Franklin.
A. R. AYERS	.	.	.	.	Concord.
J. C. MORRISON	.	.	.	.	Boscawen.

DIRECTORS.

John D. Lyman, Exeter.	Alfred H. Colby, Tilton.
George F. Blanchard, Canterbury.	Daniel G. Holmes, Webster.
Mark F. Hill, Washington.	J. W. Cogswell, Gilmanton.
Jason T. Burns, Milford.	Warren Tripp, Epsom.
Bela Graves, Unity.	John E. Baldwin, Dublin.
Milton P. Bailey, Claremont.	John Shaw, Salisbury.
C. L. Trow, Amherst.	Benjamin Willard, Dublin.
Aldon E. Cummings, Hudson.	Veron Eaton, Mason.
L. M. Swallow, Hollis.	Frank R. Woodward, Hill.
Elijah A. Robbins, Nashua.	J. G. Clark, Franklin.
Andy Holt, Lyndeborough.	John B. Sanborn, Concord.
Abram M. Mitchell, Acworth.	Daniel S. Clay, Tilton.
Charles White, Wilton.	Frank T. Cheney, Pembroke.
Frank O. Lamson, Mt. Vernon.	Nathan B. Bly, Newbury.

- Albert Weld, Cornish.
E. E. Parker, Merrimack.
Henry Richardson, Francestown.
Charles H. Dutton, Bennington.
Dewitt C. Bragdon, Wilton.
Albert C. Frost, Peterborough.
Edgar F. Sawyer, New Ipswich.
Albert A. Pressey, Derry.
Joseph Wood, Henniker.
Henry Moore, Goffstown.
Alvin Tubbs, Deering.
Horace Caldwell, Dunbarton.
James G. Stone, Londonderry.
Ezra C. Barnes, Manchester.
Frank Forristall, Alstead.
Zeb Twitchell, Lancaster.
F. H. Cross, Monroe.
Charles R. Allen, Littleton.
George F. Smith, Meredith.
Jewell Gove, Gilford.
William Woodbury, New Boston.
George Simons, Weare.
E. A. Rodiman, Bath.
J. M. Connor, Hopkinton.
C. H. Morrill, Bradford.
D. S. Bridgman, Hanover.
Charles H. Dimick, Lyme.
Edwin W. Gay, Hillsborough.
S. B. Jenness, Strafford.
Fred G. Richardson, Canaan.
Arthur M. Powers, Grafton.
F. B. Morse, Enfield.
Frederic Huntoon, Danbury.
A. M. Shackford, Canaan.
Horace C. Silver, Deerfield.
John E. Hall, Lisbon.
David P. Hardy, Hebron.
Daniel S. Woodman, Strafford.
William T. Wentworth, Dover.
William E. Davis, Chesterfield.
A. R. Ayers, Concord.
Charles R. Worcester, Swanzey.
Thaddeus W. Barker, Nelson.
L. J. Miner, Whitefield.
Howard B. Holman, Tilton.
Charles Mason, Marlborough.
C. F. Davis, Barnstead.
S. J. P. Hadley, Laconia.
George M. Munsey, Chichester.
Stephen P. Chesley, Durham.
Martin Woodman, Meredith.
Manassa Perkins, Jefferson.
George W. Stanley, Langdon.
Charles P. Freeman, Lebanon.
Willard H. Griffin, Auburn.
George F. Horne, Wolfeborough.
George E. Newman, Gilsum.
Charles H. Brown, Ossipee.
Henry W. Nims, Keene.
John F. French, Chichester.
S. O. Davenport, Hinsdale.
John J. Hardison, Rindge.
Byron E. Martin, Jaffrey.
James Burnap, Marlow.
Lucius Bond, Dalton.
C. H. Cobb, Westmoreland.
A. Warren Swan, Winchester.
Frank C. Tyler, Freedom.
R. D. Gay, Manchester.
George W. Copp, Tuftonborough.
Edward N. Greenough, Atkinson.
J. P. Gove, Goshen.
J. W. Scott, Chesterfield.
William D. Tasker, Conway.
Lewis R. Cass, Richmond.
Elroy J. Robie, Hooksett.
Irving M. Heath, Newton.
D. G. Roberts, Goffstown.
Alvah B. Chellis, Meriden.
J. Fred Fellows, Andover.

George H. Springfield, Rochester.	Horace R. Fifield, Sullivan.
John M. Carr, Wilmot.	Gilbert A. Petts, Winchester.
George H. Haley, Andover.	Charles H. Downing, Alton.
S. W. Shattuck, Warner.	John A. Weber, Surry.
George W. Gage, Sutton.	Carlos M. Barnard, Troy.
Walter H. Dow, Campton.	B. F. Fellows, Sandwich.
John C. Morrison, Boscawen.	George O. Capron, Swanzey.
James E. Shepard, New London.	Jas. A. Chute, Ossipee.
Albert B. Reed, Stoddard.	B. Frank Davis, Lee.
Sewell N. Lougee, Pittsfield.	Z. E. Tilton, Bristol.
George T. Buchanan, Antrim.	

The sixth annual exhibition of the New Hampshire Grange Fair Association was held on the Tilton and Franklin Driving Park, Tilton, N. H., September 15, 16, and 17, 1891. Like the preceding exhibitions of this association it was successful in all particulars and received a larger patronage than ever. The following list of premiums will give much information relative to the exhibition :

JERSEY STOCK.

HERD PREMIUMS.

1st, Warren F. Daniell, Franklin.

BULLS.

Three years. — 1st, Warren F. Daniell, Franklin; 2d, Charles W. Emery, Canterbury.

One year. — Fred Goodell, Sanbornton.

COWS.

Four years or over. — 1st, Warren F. Daniell, Franklin; 2d, Charles W. Emery, Canterbury.

HEIFERS.

Three years. — 1st, Warren F. Daniell, Franklin; 2d, Charles W. Emery, Canterbury.

Two years. — 1st, Warren F. Daniell, Franklin.

One year. — W. F. Daniell, Franklin.

HEIFER CALVES.

1st and 2d, Warren F. Daniell, Franklin.

Judges. — T. D. Curtis, A. W. Cheever, J. G. Tallant.

HOLSTEINS.

HERD PREMIUMS.

1st, D. H. Goodell, Antrim; 2d, H. B. French, Gaza.

BULLS.

Three years or over. — 1st and 2d, D. H. Goodell, Antrim.

Two years. — 1st, H. B. French, Gaza.

One year. — 1st, D. H. Goodell, Antrim.

BULL CALVES.

1st, H. B. French, Gaza; 2d, D. H. Goodell, Antrim.

COWS.

Four years or over. — 1st and 2d, D. H. Goodell, Antrim.

HEIFERS.

Three years. — 1st, D. H. Goodell, Antrim.

Two years. — 1st, D. H. Goodell, Antrim; 2d, H. B. French, Gaza.

One year. — 1st and 2d, H. B. French, Gaza.

HEIFER CALVES.

1st, D. H. Goodell, Antrim; 2d, H. B. French, Gaza.

Judges. — T. D. Curtis, A. W. Cheever, J. G. Tallant.

AYRSHIRE.

HERD PREMIUMS.

1st, Andy Holt, South Lyndeborough; 2d, Ansel F. Gove, Gilford Village.

BULLS.

Three years or over. — 1st, Andy Holt, South Lyndeborough; 2d, Ansel F. Gove, Gilford Village.

BULL CALVES.

1st, Andy Holt, South Lyndeborough.

COWS.

Four years or over. — 1st, Ansel F. Gove, Gilford Village; 2d, Andy Holt, South Lyndeborough.

HEIFERS.

Three years. — 1st, Andy Holt, South Lyndeborough.

Two years. — 1st, Ansel F. Gove, Gilford Village.

One year. — 1st, Andy Holt, South Lyndeborough; 2d, Ansel F. Gove, Gilford Village.

HEIFER CALVES.

1st, Andy Holt, South Lyndeborough; 2d, Ansel F. Gove, Gilford Village.

Judges. — T. D. Curtis, A. W. Cheever, J. G. Tallant.

SHORT HORNS.

HERD PREMIUMS.

1st, W. C. Wells, Belmont.

BULLS.

Three years or over. — 1st, W. C. Wells, Belmont.

COWS.

Four years or over. — 1st and 2d, W. C. Wells, Belmont.

HEIFERS.

Three years. — 1st and 2d, W. C. Wells, Belmont.

HEIFER CALVES.

1st, W. C. Wells, Belmont.

Judges. — T. D. Curtis, A. W. Cheever, J. G. Tallant.

DEVONS.

HERD PREMIUMS.

1st, John B. Sanborn, East Concord; 2d, William Neal, Meredith.

BULLS.

Three years or over. — 1st, John B. Sanborn, East Concord; 2d, C. W. Whicher, Tilton.

Two years. — 1st, William Neal, Meredith.

One year. — 1st, Ward Parker & Son, Reed's Ferry; 2d, John B. Sanborn, East Concord.

BULL CALVES.

1st, John B. Sanborn, East Concord; 2d, Arthur G. Moore, Tilton.

COWS.

Four years or over. — 1st, C. W. Whicher, Tilton; 2d, John B. Sanborn, East Concord.

HEIFERS.

Three years. — 1st, William Neal, Meredith; 2d, Arthur G. Moore, Tilton.

Two years. — 1st, John B. Sanborn, East Concord; 2d, C. W. Whicher, Tilton.

One year. — 1st, Arthur G. Moore, Tilton; 2d, C. W. Whicher, Tilton.

HEIFER CALVES.

1st, William Neal, Meredith; 2d, Ward Parker & Sons, Reed's Ferry.

Judges. — T. D. Curtis, A. W. Cheever, J. G. Tallant.

HEREFORDS.

HERD PREMIUMS.

1st, John P. Kimball, Canterbury; 2d, Thomas W. Taylor, Sanbornton.

BULLS.

Three years or over. — 1st, Herbert N. Clay, Laconia; 2d, W. P. Small, Canterbury.

Two years. — 1st, Seth Quimby, Bow.

One year. — 1st, Seth Quimby, Bow.

COWS.

Four years or over. — 1st, Seth Quimby, Bow; 2d, John P. Kimball, Canterbury.

HEIFERS.

Three years. — 1st, Herbert N. Clay, Laconia; 2d, John P. Kimball, Canterbury.

Two years. — 1st, John P. Kimball, Canterbury; 2d, Herbert N. Clay, Laconia.

One year. — 1st, John P. Kimball, Canterbury; 2d, Herbert N. Clay, Laconia.

HEIFER CALVES.

1st, Herbert N. Clay, Laconia; 2d, Thomas W. Taylor, Sanbornton.

Judges. — T. D. Curtis, A. W. Cheever, J. G. Tallant.

GUERNSEYS.

BULLS.

Two years. — 1st, A. H. Colby, Tilton.

COWS.

Four years or over. — 1st and 2d, A. H. Colby, Tilton.

HEIFERS.

One year. — 1st, A. H. Colby, Tilton.

HEIFER CALVES.

1st, A. H. Colby, Tilton.

Judges. — T. D. Curtis, A. W. Cheever, J. G. Tallant.

GRADE OR CROSS BREED.

COWS.

Four years or over. — 1st, John L. Kelley, Franklin Falls;
2d, A. H. Colby, Tilton.

HEIFERS.

Three years. — 1st, A. H. Colby, Tilton; 2d, John B. Sanborn, East Concord.

Two years. — 1st, A. H. Colby, Tilton.

One year. — 1st, William Neal, Meredith; 2d, Charles H. Ayers, Northfield.

HEIFER CALVES.

1st, Ansel F. Gove, Gilford Village; 2d, W. H. Neal, Meredith.

COW WITH SHOW OF STOCK.

1st, Arthur G. Moore, Tilton.

Judges. — Oliver Bailey, P. C. Clough, Henry W. Nims.

SWEEPSTAKES.

FOUR COWS OR HEIFERS FOR MILK.

1st, D. H. Goodell, Antrim; 2d, A. H. Colby, Tilton.

FOUR COWS OR HEIFERS FOR BUTTER.

1st, A. H. Colby, Tilton.

Judges. — John G. Tallant, E. B. Merrill.

GRANGE TEAMS.

OX-TEAMS, SIX PAIRS.

1st, G. F. Smith, Meredith, for Winnepesaukee Grange;
2d, Daniel S. Clay, Tilton, for Friendship Grange; 3d, S.
J. P. Hadley, Laconia, for Laconia Grange.

STEER-TEAMS, SIX PAIRS.

1st, S. J. P. Hadley, Laconia, for Laconia Grange.

Judges. — J. E. Shepard, D. W. Rugg, J. M. Carr.

INDIVIDUAL OX-TEAMS, THREE PAIRS.

1st, S. F. and W. H. Wadleigh, Meredith; 2d, J. F.
Crockett, Laconia; 3d, J. E. Smith, Tilton.

Judges. — J. E. Shepard, D. W. Rugg, J. M. Carr.

WORKING OXEN AND STEERS.

Five years or over. — 1st, S. F. and W. H. Wadleigh,
Meredith; 2d, J. E. Smith, Tilton.

Four years. — 1st, S. F. and W. H. Wadleigh, Meredith;
2d, Jacob Sanborn, Laconia.

Three years. — 1st, Charles O. Copp, Gilford Village; 2d,
John Shaw, Salisbury.

Two years. — 1st, J. P. Sanborn, Franklin Falls; 2d,
Jacob Sanborn, Laconia.

One year. — 1st, Charles H. Ayers, Northfield Depot; 2d,
F. H. Robinson, North Sanbornton.

CALVES.

1st, Ora G. Ladd, Laconia; 2d, Edwin G. Ladd, Laconia.

TRAINED CALVES.

1st, J. B. Calef, Sanbornton; 2d, Edwin G. Ladd,
Laconia.

Judges. — Oliver Bailey, P. C. Clough, H. W. Nims.

PULLING OXEN.

Over six feet ten inches. — 1st, J. F. Crockett, Laconia; 2d, J. F. Leighton, Franklin Falls; 3d, Jacob Sanborn, Laconia.

Under six feet ten inches. — 1st, Byron Shaw, Franklin Falls; 2d, A. G. Moore, Tilton; 3d, Jacob Sanborn, Laconia; 4th, H. W. Libby, East Andover.

PULLING STEERS.

Three years. — 1st, Charles O. Copp, Gilford Village; 2d, Jacob Sanborn, Laconia; 3d, John Shaw, Salisbury.

Two years and under three years. — 1st and 2d, Byron Shaw, Franklin Falls.

1st, (Sweepstakes) D. H. Goodell, Antrim.

Judges. — J. E. Shepard, Charles McDaniel, D. W. Rugg.

HORSES, STANDARD.

STALLIONS, SWEEPSTAKES.

1st, F. L. Gerald, Laconia.

Judges. — T. O. King, Alonzo Towle, C. H. Bowles.

STALLIONS.

Five years and over. — 1st, F. L. Gerald, Laconia; 2d, C. W. Davis, Dover.

Four years. — 1st, C. W. Davis, Dover; 2d, Isaac W. Bushey, Concord.

Three years. — 1st, F. L. Gerald, Laconia; G. W. Silver, Penacook.

Two years. — 1st, Warren F. Daniell, Franklin; 2d, G. W. Silver, Penacook.

One year. — 1st, Warren F. Daniell, Franklin; 2d, H. P. Shaw, Salisbury Centre.

Judges. — T. O. King, Alonzo Towle, C. H. Bowles.

BROOD MARES WITH COLTS.

1st, H. P. Shaw, Salisbury Centre; 2d, A. R. Ayers, North Boscawen.

Judges. — T. O. King, Alonzo Towle, C. H. Bowles.

GELDINGS, MARES, AND FILLIES.

Three years. — 1st, Warren F. Daniell, Franklin; 2d, H. P. Shaw, Salisbury Centre.

Two years. — 1st, Herbert L. Brown, Canterbury Depot.

One year. — Charles V. Fisher, Penacook.

Judges. — T. O. King, Alonzo Towle, C. H. Bowles.

HORSES, NON-STANDARD.

STALLIONS.

Five years or over. — 1st, C. G. Blanchard, Concord; 2d, C. W. Cummings, Warren.

Four years. — 1st, A. W. Summer, West Henniker; 2d, C. H. Gordon, Bristol.

Three years. — 1st, George F. Kelley, Lower Gilmanton; 2d, C. G. Blanchard, Concord.

Two years. — 1st, C. J. Chamberlain, Northfield Depot; 2d, C. G. Blanchard, Concord.

Stallions under one year. — 1st, A. R. Ayers, North Boscawen; 2d, Warren F. Daniell, Franklin.

Judges. — T. O. King, Alonzo Towle, C. H. Bowles.

BROOD MARES WITH SHOW OF COLTS.

1st, A. R. Ayers, North Boscawen; 2d, Warren F. Daniell, Franklin.

GELDINGS, MARES, AND FILLIES.

Four years. — 1st, Fred L. Lee, Derry.

Three years. — 1st, James D. Meader, Newmarket; 2d, W. W. Darrar, Reed's Ferry.

Two years. — 1st, Clyde A. Gile, Tilton; 2d, George W. Hodgdon, New Hampton.

One year.—1st, C. W. Davis, Dover; 2d, Herbert N. Clay, Laconia.

Under one year.—1st, George F. Kelley, Lower Gilman-ton; 2d, George P. Chadwick, Boscawen.

Judges.—T. O. King, Alonzo Towle, C. H. Bowles.

DRAFT STALLIONS.

Five years or over.—1st, James M. Jackson, Amherst Station.

Two years.—1st, Charles V. Fisher, Penacook; 2d, A. A. Pressey, East Derry.

Under one year.—1st, A. A. Pressy, East Derry.

Judges.—T. O. King, Alonzo Towle, C. H. Bowles.

GENT'S DRIVING HORSES.

Green horses.—1st, Levi Clark, Pittsfield; 2d, C. H. Gordon, Bristol.

Walking horses.—1st, Charles V. Fisher, Boscawen; 2d, A. H. Colby, Tilton.

Judges.—T. O. King, Alonzo Towle, C. H. Bowles.

DRAFT HORSES.

For best pair.—1st, W. F. Daniell, Franklin; 2d, A. J. Small, Dover.

Judges.—J. E. Shepard, D. W. Rugg, Charles McDaniel.

MATCHED DRIVING HORSES.

1st, W. D. Tuttle, East Andover; 2d, John B. Sanborn, East Concord.

Judges.—T. O. King, Alonzo Towle, C. H. Bowles.

SHEEP.

LONG WOOLED SHEEP (THOROUGHbred).

RAMS.

Two years or over.—1st, Jewell Gove, Gilford Village.

One year and under two.—1st, Jewell Gove, Gilford Village.

LAMBS.

1st, Charles O. Copp, Gilford Village; 2d, Jewell Gove, Gilford Village.

EWES.

Two years or over. — 1st, Jewell Gove, Gilford Village; 2d, Charles O. Copp, Gilford Village.

One year. — 1st, Jewell Gove, Gilford Village; 2d, Charles O. Copp, Gilford Village.

LAMBS.

1st, Charles O. Copp, Gilford Village; 2d, Jewell Gove, Gilford Village.

LONG WOOLED SHEEP (GRADES).

RAMS.

Two years or over. — 1st, Arthur E. Moore, Tilton; 2d, A. H. Colby, Tilton.

One year. — Arthur G. Moore, Tilton; 2d, Jewell Gove, Gilford Village.

LAMBS.

1st, Jewell Gove, Gilford Village; 2d, Charles O. Copp, Gilford Village.

EWES.

Two years or over. — 1st and 2d, Cyrus Swain, North Sanbornton.

One year. — Jewell Gove, Gilford Village.

LAMBS.

1st, Charles H. Ayers, Northfield Depot; 2d, Arthur G. Moore, Tilton.

Judges. — J. L. Gerrish, C. J. White, Warren Tripp.

SOUTH DOWNS (THOROUGHbred).

RAMS.

Two years or over. — 1st, William Neal, Meredith.

LAMBS.

1st and 2d, William Neal, Meredith.

EWES.

Two years or over. — 1st and 2d, William Neal, Meredith.

One year. — 1st, William Neal, Meredith.

LAMBS.

1st, William Neal, Meredith.

SOUTH DOWNS (GRADES).

RAMS.

1st, C. W. Whicher, Tilton.

EWES.

Two years. — 1st, C. W. Whicher, Tilton.

SHROPSHIRE DOWNS (THOROUGHbred).

RAMS.

Two years or over. — 1st, Ward Parker & Son, Reed's Ferry; 2d, A. H. Colby, Tilton.

One year. — 1st, John B. Sanborn, East Concord.

LAMBS.

1st, Ward Parker & Son, Reed's Ferry; 2d, John B. Sanborn, East Concord.

EWES.

Three years or over. — 1st, Ward Parker & Son, Reed's Ferry; 2d, John B. Sanborn, East Concord.

One year. — 1st, John B. Sanborn, East Concord.

LAMBS.

1st, Ward Parker & Son, Reed's Ferry; 2d, John B. Sanborn, East Concord.

SHROPSHIRE DOWNS (GRADES).

RAM LAMBS.

1st and 2d, Cyrus Swain, North Sanbornton.

EWES.

One year. — 1st and 2d, Cyrus Swain, North Sanbornton.

LAMBS.

1st, Cyrus Swain, North Sanbornton; 2d, A. H. Colby, Tilton.

Judges. — J. L. Gerrish, C. J. White, Warren Tripp.

SWINE.

BERKSHIRE (THOROUGHbred).

Boar, over two months. — 1st and 2d, H. O. Mathews, Concord.

Sow, over two months. — 1st and 2d, H. O. Mathews, Concord.

BERKSHIRE (GRADES).

Boar, over six months. — 1st, H. O. Mathews, Concord.

Brood sow, over six months. — 1st, W. H. Neal, Meredith; 2d, John L. Kelley, Franklin Falls.

Boar pigs, over two months. — 1st, W. H. Neal, Meredith.

Sow, over two months. — 1st, H. O. Mathews, Concord; 2d, W. H. Neal, Meredith.

Suckling Pigs. — 1st, John L. Kelley, Franklin Falls.

Judges. — Erastus C. Bailey, W. E. Gay, Jonathan M. Taylor.

POLAND CHINA (THOROUGHbred).

Boar, over six months. — 1st, H. O. Mathews, Concord.

Sow, over six months. — 1st, H. O. Mathews, Concord.

Boar, over two months. — 1st, H. O. Mathews, Concord.

Sow, over two months. — 1st, H. O. Mathews, Concord.

Judges. — W. E. Gay, Erastus C. Bailey, Jonathan M. Taylor.

CHESTER WHITE (THOROUGHbred).

Boar, over six months. — 1st, H. O. Mathews, Concord.

Sow, over six months. — 1st, H. O. Mathews, Concord.

Boar, over two months. — 1st and 2d, H. O. Mathews, Concord.

Sow, over two months. — 1st, H. O. Mathews, Concord; 2d, Charles F. Ayers, Canterbury.

Judges. — Erastus C. Bailey, W. E. Gay, Jonathan M. Taylor.

JERSEY RED (THOROUGHbred).

Boar over six months. — 1st, C. W. Whicher, Tilton.

Sow, over six months. — 1st and 2d, C. W. Whicher, Tilton.

Litter of pigs. — 1st, C. W. Whicher, Tilton.

Judges. — W. F. Gay, Erastus C. Bailey, Jonathan M. Taylor.

SMALL YORKSHIRE (THOROUGHbred).

Boar, over six months. — 1st, H. O. Mathews, Concord.

Boar, over two months. — 1st, H. O. Mathews, Concord.

Sow, over two months. — 1st, H. O. Mathews, Concord.

Judges. — Erastus C. Bailey, W. E. Gay, Jonathan M. Taylor.

POULTRY.

LIGHT BRAHMAS.

1st, E. B. Merrill, East Andover; 2d, A. R. Ayers, North Boscawen.

PLYMOUTH ROCKS.

1st, H. B. Holman, East Tilton; 2d, V. M. Sanborn, Franklin Falls.

Chicks. — 1st, W. O. Field, West Concord; 2d, V. M. Sanborn, Franklin Falls.

BROWN LEGHORN.

Chicks. — 1st, Leslie Gordon, Franklin Falls; 2d, W. O. Field, East Concord.

WYANDOTTES.

1st, Charles H. Foss, Tilton; 2d, Leslie Gordon, Franklin Falls.

BLACK BREASTED RED GAME.

1st, William Neal, Meredith.

Chicks. — 1st, William Neal, Meredith.

SILVER PENCILED HAMBURGS.

1st, J. W. Folsom, Salisbury.

Chicks. — 2d, J. W. Folsom, Salisbury.

SILVER SPANGLED HAMBURGS.

1st, Herlie H. Sanborn, East Concord.

HOUDANS.

Chicks. — 1st, F. C. Bailey, Sanbornton.

WHITE PLYMOUTH ROCKS.

1st and 2d, Frank T. Moore, Goffstown.

PEKIN BANTAMS.

1st, Leslie Gordon, Franklin Falls.

RED PILE.

1st, William Neal, Meredith.

ROWEN DUCKS.

1st, William Neal, Meredith.

PEKIN DUCKS.

1st, W. O. Field, East Concord.

WHITE CRESTED BLACK POLISH.

1st, F. C. Bailey, Sanbornton.

GUINEA FOWLS.

1st, Frank T. Hersey, Tilton; 2d, W. H. Neal, Meredith.

Judge. — H. W. Hilson

FRUIT.

APPLES.

General exhibit. — 1st, George Simons, Weare; 2d, C. C. Shaw, Milford.

FALL APPLES.

Five varieties. — J. Y. Jewett, Lake Village; 2d, C. C. Shaw, Milford.

WINTER APPLES.

Five varieties. — 1st, Albert A. Bertwell, Ossipee; 2d, George Simons, Weare.

RED ASTRACHAN.

1st, George Simons, Weare; 2d, V. M. Sanborn, Franklin Falls.

EARLY HARVEST.

2d, George Simons, Weare.

TETOFSKY.

1st, George Simons, Weare.

SWEET BOUGH.

1st, T. S. Pulsifer, Campton; 2d, V. M. Sanborn, Franklin Falls.

PORTER.

1st, J. Y. Jewett, Lake Village; 2d, Ned Dearborn, Tilton.

TWENTY OUNCE.

1st, G. F. Smith, Meredith; 2d, George Simons, Weare.

GRAVENSTEIN.

1st, C. C. Shaw, Milford; 2d, George Simons, Weare.

MAIDEN'S BLUSH.

1st, Ellen S. Shaw, Franklin Falls; 2d, A. Woodbury, Goffstown Centre.

FAMEUSE.

1st, George Simons, Weare; 2d, M. H. Merrow, New Hampton.

BLUE PEARMAIN.

1st, George W. Dearborn, Hill; 2d, Daniel S. Clay, Tilton.

GOLDEN SWEET.

1st, James W. Foss, Rochester; 2d, N. C. Sanborn, Rochester.

GRANITE BEAUTY.

1st, George Simons, Weare.

LADY'S SWEET.

1st, H. B. Sanborn, Webster; 2d, G. F. Smith, Meredith.

TALMAN'S SWEET.

1st, V. M. Sanborn, Franklin Falls; 2d, George Dearborn, Hill.

DUCHESS OF OLDENBURG.

1st, F. G. Hersey, East Andover; 2d, J. Y. Jewett, Lake Village.

WILLIAM'S FAVORITE.

1st, J. Y. Jewett, Lake Village; 2d, G. F. Smith, Meredith.

BALDWIN.

1st, Albert A. Bertwell, Ossipee; 2d, C. C. Shaw, Milford.

RHODE ISLAND GREENING.

1st, G. F. Smith, Meredith; 2d, Albert A. Bertwell, Ossipee.

NORTHERN SPY.

1st, G. F. Smith, Meredith; 2d, H. B. Sanborn, Webster

HUBBARDSTON NONESUCH.

1st, C. C. Shaw, Milford; 2d, George Simons, Weare.

BEN DAVIS.

1st, C. F. Davis, Barnstead; 2d, James W. Foss, Rochester.

KING OF TOMPKINS COUNTY.

1st, Albert A. Bertwell, Ossipee; 2d, George W. Dearborn, Hill.

ROXBURY RUSSET.

1st, Byron Shaw, Franklin Falls; 2d, G. F. Smith, Meredith.

NODHEAD.

1st, Ellen S. Shaw, Northfield; 2d, G. H. Wadleigh, Tilton.

GILLIFLOWER.

1st, George Simons, Weare; 2d, G. F. Smith, Meredith.

MCINTOSH RED.

1st, A. H. Colby, Tilton.

SHAW.

1st, C. C. Shaw, Milford.

FALLAWATER.

1st, D. G. Roberts, Goffstown.

ALEXANDER.

1st, Alvah E. Otis, Rochester.

MILDING.

1st, C. F. Davis, Centre Barnstead.

FALL JENNETTING.

1st, James W. Foss, Rochester.

GRAPES.

General exhibit. — 1st, George Simons, Weare; 2d, D. G. Roberts, Goffstown.

CONCORD.

1st, D. G. Roberts, Goffstown; 2d, George Simons, Weare.

DELAWARE.

1st, D. G. Roberts, Goffstown; 2d, George Simons, Weare.

HARTFORD PROLIFIC.

1st, Mrs. Emma Merrill, Goffstown.

MOORE'S EARLY.

1st, J. W. Folsom, Salisbury; 2d, W. E. Gay, Hillsborough.

SALEM.

2d, George Simons, Weare.

WORDEN.

1st, George Simons, Weare.

BRIGHTON.

1st, W. F. Gay, Hillsborough.

LADY EMPIRE STATE.

2d, W. E. Gay, Hillsborough.

DAME'S AMBER.

1st, C. W. Dame, Rochester.

PEACHES.

Four varieties. — 2d, T. C. Sweatt, Webster.

CRAWFORD'S EARLY.

1st, W. E. Gay, Hillsborough.

CRAWFORD'S LATE.

1st, W. E. Gay, Hillsborough; 2d, T. C. Sweatt, Webster.

FOSTER.

1st, W. E. Gay, Hillsborough; 2d, James W. Foss, Rochester.

SEEDLING.

1st, W. E. Gay, Hillsborough; 2d, John M. Colby, Hooksett.

RED RARERIPE.

1st, T. C. Sweatt, Webster.

SUSQUEHANNA.

1st, W. E. Gay, Hillsborough.

PLUMS.

Four varieties. — 1st, G. E. Smith, Meredith; 2d, F. G. Hersey, East Andover.

LOMBARD.

1st, R. N. S. Batchelder, Northfield; 2d, John B. Yeaton, Northfield.

JEFFERSON.

1st, F. G. Hersey, East Andover; 2d, G. F. Smith, Meredith.

BRADSHAW.

1st, W. E. Gay, Hillsborough.

NIAGARA.

1st, R. N. S. Batchelder, Northfield.

GREEN GAGE.

1st, G. F. Smith, Meredith.

DUANE'S PURPLE.

1st, T. S. Pulsifer, Plymouth.

GERMAN PRINCE.

1st, W. E. Gay, Hillsborough.

WASHINGTON.

1st, W. E. Gay, Hillsborough.

MOORE'S ARCTIC.

1st, George Simons, Weare.

QUINCES.

YELLOW.

1st, W. F. Wadleigh, Webster; 2d, T. C. Sweatt, Webster.

PEARS.

Eight varieties. — 1st, Albert A. Bertwell, Ossipee; 2d, C. C. Shaw, Milford.

BARTLETT.

1st, G. F. Smith, Meredith; 2d, F. P. Wentworth, Rochester.

BELLE LUCRATIVE.

1st, George Simons, Weare; 2d, C. C. Shaw, Milford.

DIX.

2d, C. C. Shaw, Milford.

DOYENNE BOUSSOCK.

1st, C. W. Dame, Rochester.

BEURRE D'ANJOU.

1st, C. W. Dame, Rochester; 2d, C. C. Shaw, Milford.

WADLEIGH.

2d, A. H. Colby, Tilton.

GOODALE.

1st, C. W. Dame, Rochester.

LOUISE BONNE DE JERSEY.

1st, F. P. Wentworth, Rochester; 2d, C. C. Shaw, Milford.

MOUNT VERNON.

1st, F. P. Wentworth, Rochester; 2d, C. C. Shaw, Milford.

ONONDAGA.

1st, C. C. Shaw, Milford; 2d, F. P. Wentworth, Rochester.

SECKEL.

1st, Mrs. John H. Kenison, Tilton; 2d, C. C. Shaw, Milford.

SHELDON.

1st, H. B. Sanborn, Webster; 2d, George Simons, Weare,

DANA'S HOVEY.

1st, F. P. Wentworth, Rochester.

URBANISTE.

2d, C. C. Shaw, Milford.

LAWRENCE.

1st, Albert A. Bertwell, Ossipee; 2d, F. P. Wentworth, Rochester.

CLAPP'S FAVORITE.

1st, George Simons, Weare; 2d, George W. Dearborn, Hill.

FLEMISH BEAUTY.

1st, Albert A. Bertwell, Ossipee.

ASSORTED PEARS.

1st, Albert A. Bertwell, Ossipee; 2d, Frank P. Wentworth, Rochester.

Judge. — O. B. Hadwen.

GRAIN AND SEEDS.

CORN, TWELVE-ROWED.

1st, John M. Colby; Hooksett; 2d, Byron Shaw, Franklin Falls; 3d, Myron C. Foster, Canterbury.

CORN, EIGHT-ROWED.

1st, Henry C. Smith, Plymouth; 2d, D. G. Roberts, Goffstown Centre; 3d, Eben B. Calef, Tilton.

POP-CORN.

1st, Byron Shaw, Franklin Falls.

SPRING WHEAT.

1st, J. Y. Jewett, Lake Village; 2d, G. W. Patterson, East Tilton.

OATS.

1st, George L. Capron, Marlborough; 2d, J. W. Folsom, Salisbury.

BARLEY.

1st, J. M. Taylor, Sanbornton; 2d, John B. Wadleigh, Gaza.

BUCKWHEAT.

1st, G. M. C. Sanborn, Penacook; 2d, G. W. Elkins, East Tilton.

INDIA WHEAT.

1st, C. W. Bedell, Littleton; 2d, R. N. S. Batchelder, Northfield.

SPRING RYE.

1st, Willie M. Batchelder, Northfield.

WINTER RYE.

1st, Morrill Moore, Tilton; 2d, John L. Kelley, Franklin Falls.

TIMOTHY SEED.

1st, R. N. S. Batchelder, Northfield; 2d, Ward Parker & Son.

LARGE FIELD BEANS.

1st, C. W. Bedell, Littleton; 2d, G. W. Elkins, East Tilton.

SMALL FIELD BEANS.

1st, Mrs. Olive J. Kelley, Franklin Falls; 2d, Morrill Moore, Tilton.

FIELD PEAS.

1st, C. W. Bedell, Littleton.

MILLET.

1st, D. G. Roberts, Goffstown.

Judges. — George R. Drake, David E. Burbank.

VEGETABLES.

BEANS, FOUR NAMED VARIETIES.

1st, Ellen S. Shaw, Franklin Falls; 2d, J. G. Clark, Franklin.

BEETS, BLOOD TURNIP.

1st, Myron C. Foster, Canterbury; 2d, Reed P. Silver, Manchester.

CABBAGE.

Winningstadt. — 1st, Luther E. Page, Gilmanton Iron works; 2d, Frank P. Stevens, Goffstown.

Flat Dutch. — 1st, Morrill Moore, Tilton.

Red. — 1st, S. B. Gilchrist, Goffstown.

Savoy. — 1st, J. F. Leighton, Franklin Falls; 2d, Morrill Moore, Tilton.

All Seasons. — 1st, S. B. Gilchrist, Goffstown; 2d, William Neal, Meredith.

Henderson's. — 1st, Charles H. Foss, Tilton; 2d, S. B. Gilchrist, Goffstown.

CARROTS.

Long Orange. — 1st, Clyde A. Gile, Tilton; 2d, Morrill Moore, Tilton.

Danvers. — 1st, L. M. French, Tilton; 2d, H. B. Holman, East Tilton.

Cheteney. — 1st, D. G. Roberts, Goffstown.

Ox Heart. — 2d, Frank P. Stevens, Goffstown.

CAULIFLOWER.

Snowball. — 1st, Morrill Moore, Tilton.

Perfection. — 1st, S. B. Gilchrist, Goffstown.

CELERY.

Boston Market. — 1st, G. F. Smith, Meredith; 2d, Jason Foss, Tilton.

White Plume. — 1st, John L. Kelley, Franklin.

Giant Paschal. — 1st, G. F. Smith, Meredith.

SWEET CORN.

Stowel's Evergreen. — 1st, T. C. Sweatt, Webster.

Early. — 1st, Morrill Moore, Tilton.

CRANBERRIES.

1st, George W. Dearborn, Hill; 2d, Mrs. F. C. Robertson, Tilton.

CUCUMBERS.

1st, Mrs. L. A. Moore, Tilton; 2d, G. F. Smith, Meredith.

Kohl Rabi. — 1st, S. B. Gilchrist, Goffstown.

MELONS.

Watermelon. — 1st, S. B. Gilchrist, Goffstown.

Green Fleshed Musk. — 1st, S. B. Gilchrist, Goffstown.

Yellow Fleshed Musk. — 1st, S. B. Gilchrist, Goffstown.

ONIONS.

Red. — 1st, H. H. Cross, East Andover; 2d, J. F. Leighton, Franklin Falls.

Yellow Danvers. — 1st, H. E. Batchelder, Loudon; 2d, W. C. Wells, Belmont.

Top. — 1st, J. F. Bailey, Sanbornton.

PARSNIPS.

Long White. — 1st, L. M. French, Tilton; 2d, Daniel S. Clay, Tilton.

POTATOES.

Early Rose. — 1st, L. M. French, Tilton; 2d, J. F. Bailey, Sanbornton.

Early Queen. — 1st, J. B. Calef, Sanbornton; 2d, John L. Kelley, Franklin Falls.

Beauty of Hebron. — 1st, G. W. Elkins, East Tilton; 2d, Otis S. Sanborn, Sanbornton.

Snowflake. — 1st, Abbie G. Durgin, Tilton; 2d, Charles H. Foss, Tilton.

Early Vermont. — 1st, Charles H. Foss, Tilton; 2d, Myron C. Foster, Canterbury.

Clark's No. 1. — 2d, Morrill Moore, Tilton.

Burpee's Early. — 1st, Myron C. Foster, Canterbury.

Burbank Seedlings. — 1st, Luther E. Page, Gilmanton Iron Works.

Early Maine. — 1st, A. H. Colby, Tilton; 2d, Byron Shaw, Franklin Falls.

Polaris. — 1st, J. M. Taylor, Sanbornton; 2d, G. W. Elkins, East Tilton.

Bliss Triumph. — 1st, Luther E. Page, Gilmanton Iron Works; 2d, G. W. Elkins, East Tilton.

Belle of Brunswick. — 2d, H. B. Holman, East Tilton.

White Star. — 1st, Luther E. Page, Gilmanton Iron Works; 2d, Morrill Moore, Tilton.

Clough's Seedlings. — 1st, P. C. Clough, Canterbury.

Charles Downing. — 1st, Charles W. Emery, Canterbury; 2d, Daniel S. Clay, Tilton.

Dakota Red. — 1st, J. F. Leighton, Franklin Falls; 2d, Morrill Moore, Tilton.

Black German. — 1st, A. R. Ayers, North Boscawen.

Stray Beauty. — 1st, P. C. Clough, Canterbury; 2d, Wm. Neal, Meredith.

Bonne. — 2d, G. E. Fellows, Salisbury.

Magnum Bonum. — 2d, William Neal, Meredith.

White Elephant. — 2d, E. B. Merrill, East Andover.

Sunlit. — 2d, J. Y. Jewett, Lake Village.

Queen of the Roses. — 1st, J. Y. Jewett, Lake Village.

Strawberry. — 2d, Charles H. Foss, Tilton.

Campbell. — 2d, Luther E. Page, Gilmanton Iron Works.

Lady's Fingers. — 1st, Abbie G. Durgin, Tilton.

Queen of the Valley. — 2d, Luther E. Page, Gilmanton Iron Works.

Early Sunrise. — 1st, Luther E. Page, Gilmanton Iron Works.

Rural Blush. — 1st, Luther E. Page, Gilmanton Iron Works.

Belle. — 1st, George E. Fellows, Salisbury.

PUMPKINS.

Field. — 1st, Clyde A. Gile, Tilton; 2d, Morrill Moore, Tilton.

Sweet. — D. G. Roberts, Goffstown; 2d, Byron Shaw, Franklin Falls.

Negro. — 1st, D. G. Roberts, Goffstown.

PEPPERS.

1st, Morrill Moore, Tilton; 2d, J. F. Bailey, Sanbornton.

SQUASHES.

Hubbard. — 1st, S. B. Gilchrist, Goffstown; 2d, John L. Kelley, Franklin Falls.

Turban. — 1st, S. D. Weeks, Hill; 2d, S. W. Elkins, East Tilton.

Bay State. — 1st, S. B. Gilchrist, Goffstown.

Summer. — 1st, Reed P. Silver, Manchester.

Putman. — 1st, S. B. Gilchrist, Goffstown; 2d, D. G. Roberts, Goffstown.

Marrow. — 1st, John L. Kelley, Franklin Falls; 2d, W. C. Wells, Belmont.

Marblehead. — 2d, S. B. Gilchrist, Goffstown.

Dewing. — 1st, Frank P. Stevens, Goffstown.

TOMATOES.

Beauty. — 1st, Reed P. Silver, Manchester.

Liveington's Perfection. — 1st, F. P. Grant, Laconia.

Plum. — 1st, John L. Kelley, Franklin.

TURNIPS.

Yellow. — 2d, Luther E. Page, Gilmanton.

White. — 2d, Luther E. Page, Gilmanton.

Rutabaga. — 1st, H. H. Cross, East Andover.

BEETS.

Mangel Wurtzel. — 1st, Charles W. Emery, Canterbury; 2d, William Neal, Meredith.

Judges. — G. W. Stevens, F. H. Flanders, G. H. Haley.

DAIRY.

BUTTER.

Dairy prints. — 1st, F. H. Robinson, North Sanbornton; 2d, Charles W. Emery, Canterbury; 3d, D. G. Roberts, Goffstown; 4th, Mrs. George B. Lane, Sanbornton.

Dairy tub. — 1st, E. C. Goodell, North Sanbornton; 2d, Charles W. Emery, Canterbury; 3d, Mrs. F. H. Robinson, Sanbornton; 4th, A. H. Colby, Tilton.

Creamery prints. — 1st, Lebanon Creamery, Lebanon; 2d, Cold Brook Creamery, Franklin Falls.

Creamery tubs. — 1st, John B. Wadleigh, Gaza.

CHEESE.

1st, T. S. Pulsifer, Plymouth; 2d, P. C. Clough, Canterbury; 3d, Henry C. Smith, Plymouth; 4th, Mrs. G. H. Healey, East Andover.

Judge. — H. K. Slayton.

BREAD (HOME MADE).

White. — 1st, Fannie Whicher, Northfield; 2d, Lucretia A. Sanborn, Franklin Falls; 3d, Kate F. Hill, Northfield.

Brown. — 1st, Martha A. Foss, Tilton; 2d, Mrs. S. D. Weeks, Sanbornton; 3d, Mrs. George B. Lane, Sanbornton.

Graham. — 1st, Mrs. F. E. Frost, Webster; 2d, Mrs. S. D. Weeks, Hill; 2d, Mrs. Olive J. Kelley, Franklin Falls.

CAKE.

1st, Miss Annie Benton, Hanover.

Judges. — Mrs. C. W. Bedell, Mrs. C. K. Sanborn, Mrs. T. J. Courser.

CANNED FRUIT AND PRESERVES.

CANNED FRUIT.

General exhibit. — Mrs. T. C. Sweatt, Webster.

Peaches. — 1st, Mrs. S. D. Weeks, Hill.

Plums. — 1st, Mrs. F. J. Thomas, North Sanbornton.

Strawberries. — 1st, Mrs. T. C. Sweatt, Webster.

Raspberries. — 1st, Mrs. John H. Kenison, Tilton.

Quinces. — 1st, Mrs. T. C. Sweatt, Webster.

Cherries. — 1st, Mrs. S. D. Weeks, Hill.

Tomatoes. — 1st, Mrs. D. G. Roberts, Goffstown.

Blackberries. — 1st, Clara B. Gove, Gilford.

Citron. — 1st, Mrs. F. J. Thomas, Sanbornton.

PRESERVES.

Quinces. — 1st, Mrs. T. C. Sweatt, Webster.

Apples. — 1st, Mrs. T. C. Sweatt, Webster.

Plums. — 1st, Mrs. T. C. Sweatt, Webster.

Pears. — 1st, Mrs. F. J. Thomas, North Sanbornton.
 Strawberries. — 1st, Mrs. T. C. Sweatt, Webster.
 Raspberries. — 1st, Mrs. T. C. Sweatt, Webster.
 Currants. — 1st, Mrs. S. D. Weeks, Hill.
 Cherries. — 1st, Mrs. T. C. Sweatt, Webster.
 Blackberries. — 1st, Mrs. T. C. Sweatt, Webster.
 Assorted Pickles. — 1st, P. C. Clough, Canterbury.
 Tomato Catsup. — 1st, Mrs. Olive J. Kelley, Franklin Falls.

JELLY.

Apple. — 1st, P. C. Clough, Canterbury.
 Raspberry. — 1st, Mrs. C. R. Allen, Littleton.
 Grape. — 1st, Mrs. George B. Lane, Sanbornton.
 Currant. — 1st, Mrs. Olive J. Kelley, Franklin.
 Blackberry. — 1st, Mrs. C. R. Allen, Littleton.
 Judges. — Mrs. C. W. Bedell, Mrs. C. K. Sanborn, Mrs. T. J. Courser.

BEES, HONEY, AND SUGAR.

BEES AT WORK.

1st, Charles H. Foss, Tilton.

HONEY IN COMB.

1st, Charles H. Foss, Tilton; 2d, C. W. Bedell, Littleton.

MAPLE SUGAR.

1st, Mrs. G. W. Sanborn, Gilford; 2d, Mrs. D. S. Clay, Tilton.

MAPLE SYRUP.

1st, Fannie Whicher, Tilton; 2d, V. M. Sanborn, Franklin Falls.

Judges. — Mrs. C. W. Bedell, Mrs. C. K. Sanborn, Mrs. T. J. Courser.

PAINTINGS.

Oil, general exhibit. — 1st, Mrs. J. W. Cogswell, Gilman-
 ton; 2d, M. Eva Dearborn, Tilton.

On china. — 1st, Mabel Blanchard, Lake Village; 2d, Mrs. Ada Stevens, Goffstown.

Flowers in oil. — 1st, Mary Burleigh, Tilton; 2d, Mrs. John C. Ela, Warren.

On silk. — 1st, Mrs. Frank Hill, Tilton; 2d, Mrs. J. W. Cogswell, Gilmanton.

On plush. — 1st, Mrs. Ada Stevens, Goffstown; 2d, Mrs. B. B. Davinson, Sanbornton.

On felt. — 1st, Mrs. D. B. Sanborn, Sanbornton; 2d, Miss Martha Stevens, Goffstown.

Crayon portrait. — 1st, Albert Saltmarsh, Concord; 2d, Lena M. Flanders, Lake Village.

Landscape from nature. — 1st, Mary Burleigh, Tilton; 2d, Mrs. J. C. Morrison, Boscawen.

Pastel. — 1st, Mrs. Ada Stevens, Goffstown; 2d, Mrs. George B. Stevens, Goffstown.

Charcoal sketch. — 1st, Mary A. Rowell, Franklin.

Crayon pictures. — 1st, Elmore C. Weeks, Hill.

Water colors. — 1st, Mrs. J. W. Cogswell, Gilmanton.

Worsted picture. — 1st, Mrs. Daniel Wyman, Concord.

Judges. — C. H. Pettee, Mrs. Charles McDaniel, Miss Alice Darling.

NATURAL HISTORY.

Living birds. — 1st, Hattie A. Yeaton, Northfield.

Stuffed birds. — 1st, Ned Dearborn, Tilton; 2d, Mrs. Lucy Holt, Goffstown.

Stuffed animals. — 1st, Ned Dearborn, Tilton; 2d, Mrs. Lucy Holt, Goffstown.

Native woods. — 1st, Ned Dearborn.

Herbarium. — 1st, Fred Fuller, Hanover; 2d, Bertha M. Sanborn, Franklin Falls.

Judges. — Lizzie F. Hill, Mrs. F. H. Flanders.

NEEDLEWORK AND EMBROIDERY.

General exhibit. — 1st, Mrs. Frank Hill, Tilton; 2d, Mrs. George M. C. Sanborn, Penacook.

Cotton embroidery. — 1st, L. A. Dyer, New Hampton; 2d, Mrs. L. E. Page, Gilmanton Iron Works.

Silk embroidery. — 1st, Mrs. Lizzie F. Hill, Derry; 2d, Josie Cook, Gilmanton.

Crochet work. — 1st, Mrs. Dr. Cooledge, Warner; 2d, Mrs. W. A. Batchelder, East Andover.

Hand-knit work. — 1st, Sarah L. Davis, Centre Barnstead; 2d, Mrs. Fred Philbrick, Meredith.

Crazy quilt, silk. — 1st, Mrs. A. Huntoon, Wing Road; 2d, Lizzie A. Brockway, Franklin Falls.

Log cabin quilt. — 1st, Nellie Lakeman, Concord; 2d, Mrs. Hattie Hutchinson, Chichester Centre.

Crocheted quilt. — 1st, Mrs. F. E. Frost, Webster.

Knotted work quilt. — 1st, Mrs. E. F. Nelson, Gilmanton.

Outline quilt. — 1st, Abbie Williams, Whitefield; 2d, Mrs. W. A. Batchelder, East Andover.

Knit quilt. — 1st, Mrs. A. W. Miner, Whitefield; 2d, Mrs. W. A. Batchelder, East Andover.

Worsted quilt. — 1st, Sarah B. Keay, Sanbornton; 2d, Mrs. S. A. Howard, New Hampton.

Calico patchwork quilt. — 1st, Mrs. M. B. Gilman, Sanbornton; 2d, Mrs. D. Coffin, Gilmanton.

Rag carpet. — 1st, Abbie Williams, Whitefield; 2d, Mrs. O. H. Glines, Whitefield.

Drawn rug. — 1st, Annie E. Ayers, North Boscawen; 2d, Mrs. Celia Hurlburt, Hanover.

Braided rug. — 1st, Mrs. O. H. Glines, Whitefield; 2d, Mrs. A. Huntoon, Wing Road.

Crocheted rug. — 1st, Dudley Leavitt, Meredith; 2d, Mrs. O. T. Clough, Goffstown.

Ravelled rug. — 1st, Mrs. S. W. Sanford, Gilford; 2d, Ellen M. Corliss, Lake Village.

Table cover. — 1st, Mrs. D. Coffin, Gilmanton; 2d, Mrs. Charles Mason, Etna.

Table scarf. — 1st, Mrs. E. C. Hutchinson, Milford; 2d, Mrs. James Cogswell, Gilmanton.

Bureau scarf. — 1st, Mrs. O. M. Carr, Meredith; 2d, Mrs. Lilla Tirrell, Goffstown.

Worsted lambrequin. — 1st, Sarah L. Davis, Centre Barnstead; 2d, Mrs. L. M. Jones, Merrimac.

Picture drapery. — 1st, Stella Paige, Belmont.

Toilet cushion. — 1st, Mrs. Orville Smith, Meredith; 2d, Mrs. Georgia Colby, Concord.

Pillow shams. — 1st, Jennie M. Huse, Centre Barnstead; 2d, Mrs. W. C. Noyes, Bethlehem.

Knit lace. — 1st, Annie E. Ayers, North Boscawen; 2d, Abbie Cotton, Milford.

Crocheted lace. — 1st, Millie F. Weeks, Gilford; 2d, Mrs. Cora Drake, New Hampton.

Darned lace. — 1st, Mrs. Sarah B. Keay, Sanbornton; 2d, Mrs. W. C. Noyes, Bethlehem.

Hand bag. — 1st, Mrs. Addie Flanders, New Hampton; 2d, Mrs. A. W. Miner, Whitefield.

Infant's basket. — 1st, Mrs. Frank Hill, Tilton; 2d, Mrs. N. J. Bachelder, East Andover.

Hand-knit hose. — 1st, Mrs. E. E. Parker, Reed's Ferry; 2d, Mary W. Gile, Tilton.

Hand-knit mittens. — 1st, Lucinda I. Colbath, Centre Barnstead; 2d, G. W. Springfield, Rochester.

Darned hose. — 1st, Mary W. Gile, Tilton; 2d, Mrs. A. Huntoon, Wing Road.

Specimen of patching. — 1st, Mrs. G. W. Moulton, Thornton's Ferry; 2d, Mrs. Isaiah Piper, Belmont.

Outline work. — 1st, Stella H. Paige, Belmont; 2d, Alice E. Moore, Goffstown.

Cotton tidy. — 1st, J. E. Smith, Tilton; 2d, Miss Abbie Cotton, Milford.

Linen tidy. — 1st, Mrs. M. A. Otis, Rochester; 2d, Mrs. C. R. Allen, Littleton.

Silk tidy. — 1st, Mrs. E. L. Clifford, Hanover; 2d, Mrs. G. W. Morrill, Gilford.

Felt tidy. — 1st, Mrs. A. Huntoon, Wing Road; 2d, Mrs. H. A. Huntoon, Danbury.

Umbrella stand. — 1st, Mrs. Frank Hill, Tilton; 2d, Mary A. Rowell, Franklin.

Sofa pillow. — 1st, Mrs. C. W. Bedell, Littleton; 2d, Mrs. Perley Kidder, Milford.

Mexican work. — 1st, Mrs. C. R. Allen, Littleton; 2d, Mrs. George M. C. Sanborn, Penacook.

Afghan. — 1st, Miss Alvena Swett, Hanover; 2d, Mellie F. Eastman, East Andover.

Best exhibit by a patron under 17 years. — 1st, Ella F. Drake, New Hampton.

Photograph case. — 1st, Mrs. J. W. English, Littleton; 2d, M. Eva Dearborn, Tilton.

Head rests. — 1st, Mrs. C. L. Pearsons, Hanover; 2d, Mrs. G. W. Sanborn, Penacook.

Handkerchief case. — 1st, Annie E. Hadley, Lake Village; 2d, Miss Mabel Glines, Northfield.

Aprons. — 1st, Miss Carrie Woodman, Tilton; 2d, Lillian Rose, Concord.

Judges. — Mrs. Lizzie F. Hill, Mrs. F. H. Flanders, Mrs. J. E. Shepard.

PLANTS AND FLOWERS.

Potted plants. — 1st, Cyrus P. Dow, Laconia; 2d, F. P. Grant, Laconia; 3d, Martha A. Foss, Tilton.

Cut flowers. — 1st, Mrs. G. E. Fellows, Salisbury; 2d, Ellen S. Shaw, Franklin Falls.

Dahlias. — 1st, E. N. Vickery, Meredith; 2d, Mrs. O. C. Wyatt, Northfield.

Verbenas. — 1st, Mrs. Carrie B. Little, Salisbury; 2d, Mrs. Olive J. Kelley, Franklin Falls.

Asters. — 1st, Mrs. M. P. Bailey, Claremont; 2d, F. O. Melvin, Bradford.

Geraniums. — 1st, Cyrus P. Dow, Laconia; 2d, Ellen S. Shaw, Franklin Falls.

Sweet peas. — 1st, Mrs. W. A. Batchelder, East Andover; 2d, Mrs. George E. Fellows, Salisbury.

Pansies. — 1st, Mrs. F. C. Robertson, Tilton; 2d, L. F. Batchelder, Tilton.

Judges. — Mrs. D. W. Rugg, Mrs. L. A. Dyer, Mrs. H. W. Nimms.

BABIES.

Handsome baby. — 1st, Mrs. C. L. Parsons, Hanover, for Annie Guerard Parsons; 2d, Mrs. A. H. Colby, Tilton, for Ethel Mildred Colby; 3d, Mrs. Fred S. Kilburn, Belmont, for Charlie Kilburn.

Tastily dressed baby. — 1st, Mrs. Mabel R. Bailey, Nashua, for Gladys Viola Bailey; 2d, Mrs. H. B. Holman, East Tilton, for Sidney Plumer Holman.

Best behaved baby. — 1st, Mrs. S. F. Burbank, Suncook, for Priscilla Ann Burbank; 2d, Mrs. Fred Huntoon, Danbury, for Mary Estelle Huntoon.

Heaviest over six months. — 1st, Mrs. Warren Hall, Pembroke, for Harry Amsden Hall; 2d, Mrs. E. C. Cole, Warner, for Edward Everett Cole.

Heaviest under six months. — 1st, Mrs. F. H. Robinson, Sanbornton, for Gary Frank Robinson; 2d, Mrs. Fred Dodge, Lancaster, for Clarence Fred Dodge.

Gladys Viola Bailey, Nashua	Medal.
Sidney Plumer Holman, East Tilton	"
Bernice Eloise Perkins, Danbury	"
Rebecca Dorothy Collins, Gilmanton	"
Mary Estelle Huntoon, Danbury	"
Maurice Edwin Downs, West Andover	"
Mildred Alma White, Danbury	"
Blanche Evelyn Thompson, Laconia	"
Mabel Elizabeth Beatty, Hartford, Conn.	"
Estelle Frances Emerson, Etna	"
Annie Guerard Parsons, Hanover	"
Clarence Fred Dodge, Lancaster	"
Priscilla Ann Burbank, Suncook	"
Marion Hazel Goodhue, Boscawen	"
Charlie Kilburn, Belmont	"
Harry Amsden Hall, Pembroke	"
Ethel Mildred Colby, Tilton	"
Gary Frank Robinson, Sanbornton	"
John Samuel Heath, Tilton	"

Earle Everett Danforth, Warner	.	.	.	.	Medal.
Edward Everett Cole, Warner	.	.	.	.	"

SPEED DEPARTMENT.

HORSES AND COLTS.

Foals of 1890. — One half mile, 2 in 3. — 1st, C. W. Davis, Dover, Beauvoir; 2d, W. F. Daniell, Franklin Falls, X. L. Time — 1.43, 1.41, 1.43.

Foals of 1889. — One half mile, 2 in 3. — 1st, W. F. Daniell, Franklin Falls, Much Ado; 2d, G. W. Silver, Penacook, New Flower; 3d, Levi Clarke, Pittsfield, Allen Boy; 4th, George R. Nichols, Barnstead, Sailing Glencoe. Time — 1.29, 1.30.

Foals of 1888. — One half mile, 3 in 5. — 1st, W. F. Daniell, Franklin Falls, Edith H; 2d, George F. Kelley, Gilmanton, Whirlwind; 3d, C. J. Chamberlain, Northfield, Sly Ben; 4th, George P. Titcomb, Salisbury, Ned Wilkes. Time — 2.52, 2.53, 2.52.

Foals of 1887. — One mile, 3 in 5. — 1st, J. E. Kent, Newmarket, Cromwood; 2d, George F. Kelley, Gilmanton, Alcoe; 3d, J. D. Cruikshank, Laconia, Joan of Arc; 4th, Sam Hodson, Meredith, Goldmont. Time — 2.43, 2.37, 2.35.

Special class. — One mile, 3 in 5. — 1st, W. F. Daniell, Franklin Falls, Lady Lewis; 2d, C. C. Kenrick, Franklin Falls, Mayflower; 3d, E. F. Hall, Gilmanton, Lynn. Time — 2.46, 2.45, 2.43, 2.46.

Three minute. — One mile, 3 in 5. — 1st, C. G. Blanchard, Concord, Ethel Lambert; 2d, C. W. Davis, Dover, Woodburn Wilkes; 3d, C. C. Kenrick, Franklin Falls, Fleetwood. Time — 2.41, 2.40, 2.41.

Stallions. — One mile, 3 in 5. — 1st, F. L. Gerald, Laconia, Glencoe Wilkes; 2d, Martin Woodman, Meredith, Falcon Boy; 3d, C. G. Blanchard, Concord, Harry Lambert; 4th, Geo. A. Brown, Contoocook, John B. Clarke. Time — 2.46, 2.47, 2.41, 2.43.

Free for all. — One mile, 3 in 5. — 1st, J. W. Wilson, Lowell, Mass., Arthur Wilkes; 2d, J. H. Taylor, Penacook, Home Rule. Time — 2.27, 2.27, 2.30.

Judges. — T. O. King, C. H. Bowles, Alonzo Towle.

F. P. JOHNSON, *Clerk*.

N. J. BACHELDER,
Secretary.

NEW HAMPSHIRE

TROTting-HORSE BREEDERS' ASSOCIATION.

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SECRETARY'S REPORT.

First meeting held at Tilton and Franklin Driving Park, Tilton, N. H., October 6, 7, and 8, 1891.

FIRST DAY.

The blasts of winter blew across Tilton park when its gates were opened to usher in the first day of the initial trotting meeting of the New Hampshire Trotting Horse Breeders' Association, yet there was a good attendance of people when the races were called this afternoon. The wintry air and blustering northwest wind were most unfavorable for trotting, yet in the face of such conditions three of the most interesting races of their kind contested in New Hampshire this season were witnessed.

The work of stock judging began shortly after 10 A. M. Mr. Harry R. Lawrence, of Brattleborough, Vt., and Mr. C. H. Bowles, of Plymouth, had this difficult duty in hand, and they entered upon their work fearlessly. The first class called was the gelding class. This was the only class connected with the meeting that had a light entry, and the judges had little difficulty in reaching a decision. They awarded first premium in the yearling class to Bert C, by Ivy Wilkes, dam by Col. Cross. This colt was bred and entered by H. N. Clay, of Laconia. The only other animal exhibited was Dandy, by George N. Wilkes. He was awarded second premium as a two-year-old.

The roadster stallion class brought out four animals, and the judges found a harder task before them. George N. Wilkes and John B. Wilkes, both sons of Mambrino Wilkes, and owned by S. K. Boyce, of Canterbury, the only ones of the number who were shown with four or more of their get, and first and second premiums respectively were awarded them. The judges awarded the blue ribbon in the same class where animals were shown without four of their get, to Beechwood by Wedgewood, dam by Shakespeare (Lily's) entered by Edgar Merrill, of Plymouth; second premium to

Ned Wilkes by Mambrino Wilkes, dam by Flying Rocket, owned by C. W. Cummings, of Warren.

The standard stallion class was called, but the judges did not have time to complete their work. Viking and Stornaway were the only horses shown. Beauvoir and possibly Glencoe Wilkes will be examined to-morrow. Viking had a family exhibit that has rarely been equalled in the North, and one that fairly captured the horsemen present.

In accordance with public announcement, the races were called sharply at 1.30 P. M. George M. Stevens, of Lancaster; H. R. Lawrence, of Brattleborough, Vt.; and C. H. Bowles, of Plymouth, were in the stand as judges. The first race called was the yearling stake. This had five starters, and a good deal of trouble was experienced in getting the youngsters off. When the word did come Bellvoir took the lead and opened up what looked like a winning lead. X. L. was in second place and drumming along right merrily. The rest were scattered along behind, several lengths apart. The Davis filly held her commanding lead past the three-quarter pole. At the upper turn she went into the air and lost several lengths. X. L., meantime, had been gaining ground and was right there ready to take advantage of any mishaps. Bellvoir entered the home stretch with a winning lead and held it to the distance post, when she broke again and did not recover until X. L. had overtaken and passed her. The Daniell colt finished strong and went under the wire a winner of the heat by an open length in 3.16½. It was a termination that was quite unexpected, yet it only furnished another example of the uncertainty of colt trotting. Irving Russell was a good third, and the others way back. X. L. was warmly applauded for his game finish. The summary:

Yearling race. Stake value, \$110. Mile dash.

X. L., b. c., by Emperor Wilkes; dam by Gov. Sprague,	
W. F. Daniell, Franklin	1
Bellvoir, b. f., by Beauvoir; dam s. t. b. by Columbus	
Horse, C. W. Davis, Dover	2

Irving Russell, b. c., by Beauvoir; dam by King Patchen, I. W. Springfield, South Wölfeborough	3
Butterfield's Almont, br. c., by Kentucky Almont; dam by Lang Horse, W. L. Butterfield, Great Falls	4
Ray Wilkes, b. f., by Mambrino Wilkes; dam by Tag- gart's Abdallah, H. P. Ray, Manchester	5
Time — 3.16½.	

Several of the colts were handicapped in a contest of mile heats, not having been fitted for such a distance.

The second race called was the Foster stakes for four-year-olds. This stake was made especially attractive by reason of the generous donation of \$100 added money, made by Mr. F. H. Foster, of Tilton, owner of Viking 2.19¼. There were four starters and the Woodbrino colt, Cromwood, who won the four-year-old race at the Grange Fair, trotting in 2.35¾, and who got a mark at Mystic last week of 2.32, was picked for a sure winner. Here again the straight tips got another upsetting. Cromwood won the first heat in 2.39, and in the second went dead lame behind, and would have been distanced twice over if distance had not been waived by mutual consent. He went lame in his off hind leg, which has been weak since he was a two-year-old, and was wisely laid up. With Cromwood out, the race lost its chief interest, for Johnny Taylor's Viking, Jr., was hot stuff, and was right on the heels of the Kent colt when he won the first heat. Had Cromwood continued all right he would have been forced to trot a merry race to beat the Taylor four-year-old, who is a sure enough trotter. Woodburn Wilkes tried to give the son of Viking a race and succeeded very well, but Taylor had links to spare whenever the son of Baron Wilkes began to threaten, and landed first money in handsome style. The victory was very popular with the crowd, besides bringing to the front another Viking colt trotter that ought to go in 2.30 this year if headed for a record. The summary tells the rest:

Foster stakes, value \$225, for foals of 1887.

Viking, Jr., b. c., by Viking, dam Molly Stark, J. H. Taylor, Penacook	2	1	1	1
Cromwood, ch. c., by Woodbrino, dam by John G. Saxe, E. Kent & Son, Newmarket	1	4	4	4
Woodburn Wilkes, b. c., by Baron Wilkes, dam by Woodburn Pilot, C. W. Davis, Dover	3	2	2	2
Joan of Arc, b. f., by Glencoe Wilkes, dam Lady Clark, J. D. Cruikshank, Laconia . .	4	3	3	3
Time — 2.39, 2.43, 2.42, 2.42.				

The third event on the programme was the 3.00 class, and was a rattling good contest. Crete was the fastest away in the first heat, and kept a safe lead on the field until she began to come home, when Thetis came with a rush. Just before the wire was reached, Thetis broke, but she caught quickly and nosed out Crete in 2.39 $\frac{1}{4}$. The judges penalized Thetis and gave the heat to Crete. In the second heat Crete led to the half, where she broke and Thetis took the pole, holding it to the end and winning as she pleased. Crete finished fourth and Ethel Lambert third. The third heat was a contest between Crete and Ethel Lambert. The former finished the mile a length ahead, but was placed last for a long run under the whip, and the heat given to Ethel Lambert. Thetis was back in fourth place this time. In the next heat she and Ethel Lambert made the fight, and a pretty one it was. "Jock" Bowen was behind the Lambert mare and he made a hot bid for the heat, but Thetis beat her home in 2.38 $\frac{1}{4}$, the fastest mile of the day. The finish of the race was then postponed until to-morrow.

Country Boy was right up among the leaders in the heats trotted, finishing second in the third mile. Glencoe Wilkes was speedy, but unsteady. Following is the summary :

3.00 Class. Purse, \$300.

Thetis, b. m., by Mambrino Wilkes, dam by Vedder's Cadmus, R. E. Foster, Webster . .	2	1	4	1
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Ethel Lambert, ch. m., by Harry Lambert, dam
 by Gen. Garibaldi, C. G. Blanchard, Concord 3 2 1 2
 Crete, ch. m., by Dictator Chief, dam by Daniel
 Lambert 1 4 5 5
 Glencoe Wilkes, b. h., by Alcantara, dam by
 Ericsson 5 5 3 3
 Time — 2.39 $\frac{1}{4}$, 2.39 $\frac{1}{2}$, 2.40, 2.38 $\frac{1}{4}$.

SECOND DAY.

Rain was falling when the managers of the New Hampshire Horse Breeders' meeting awoke this morning, and hundreds of people all over the State who had planned to attend, remained at home. It was a discouraging outlook, but matters at the track progressed as smoothly as if clear skies and sunshine prevailed. The judges began their work promptly and did an enormous forenoon's work in the stock department. No such a show of colts and fillies was ever seen in New Hampshire as that brought out for their inspection. The judges were critical yet fair, and the ribbon winners had reason to feel elated at their success. It was winning in hot company. The awards resulted as follows:

STALLION COLTS.

Four years old. — 1st, Cleveland, ch. c., by Sir Walter, 2001; dam by Jubilee Lambert, 2.25. Entered by F. H. Foster, Tilton. 2d, Ivy Wilkes, b. c., by Don Wilkes, 2.24 $\frac{3}{4}$; dam by Mambrino Dudley, 2.19 $\frac{3}{4}$. Entered by H. N. Clay, Laconia.

Three years old. — 1st, Jerullo, 10662, by Thorndale Chief; dam Lady Durgin, by Walter Allen. Entered by M. A. Foster, Canterbury. 2d, Kalif, 11150, by Kaiser, 2.28 $\frac{1}{2}$; dam by Smuggler, 2.15 $\frac{1}{4}$. Entered by W. T. Greene, Hopkinton.

Two years old. — 1st, Kinglet, by Viking; dam by Gen. Garibaldi. Entered by C. G. Blanchard, Concord. 2d, King Turner, by Jerome Turner, 2.15 $\frac{1}{2}$; dam by Princeps, 536. Entered by Mt. Washington Stock Farm, Lancaster.

One year old. — 1st, X. L., by Emperor Wilkes, 2.20 $\frac{3}{4}$; dam

by Gov. Sprague, 2.20½. Entered by Warren F. Daniell, Franklin. 2d, Irving Russell, by Beauvoir, 9218; dam by King Patchen. Entered by I. W. Springfield, South Wolfborough.

Class D, Fillies.

Four years old. — 1st, Clara K. Nelson, by Nelson, 2.10; dam Nabby Day, by son of Ballard's Cassius M. Clay, Jr. Entered by C. C. Kenrick, Franklin. 2d, Agnesia Wilkes, by Mambrino Wilkes; dam by Hodgdon's Black Hawk. Entered by Grasmere Stock Farm, Goffstown.

Three years old. — 2d, Gannett, by Mambrino Wilkes, 2.28¾; dam by General Lyon, 493. Entered by Hale P. Shaw, Canterbury. No first premium awarded.

Two years old. — 1st, Sadie Splan, by Jack Splan, 2.26¾; dam by Vermont Ranger, 7436. Entered by E. F. Pike, Franklin Falls. 2d, Millie Beauvoir, by Beauvoir; dam by Davis' Honest Allen. Entered by C. W. Davis, Dover.

One year old. — 1st, Modesty, by Viking, 2.19¼; dam by Supervisor, son of Administrator. Entered by Mt. Washington Stock Farm, Lancaster. 2d, Slick Mirror, by Electryon; dam Viking's Pride, by Viking, 2.19¼. Entered by Grasmere Stock Farm, Goffstown.

The afternoon was devoted to the races. The unfinished 3.00 class was first called, and when the horses were rung up at 1 o'clock the grand stand was fairly well filled and rows of carriages lined the track. It was a capital attendance, considering the weather. Rain held off throughout the afternoon and the entire programme of the day was carried out without postponement.

Tetis had two heats to her credit, and Ethel Lambert and Crete one each when the race was postponed Tuesday night. Tetis was the favorite. Crete was fastest away when the fifth heat was started and maintained a good lead until she entered the stretch coming home. Then Ethel Lambert closed on her and beat her to the wire, but was set back for running, and the heat awarded to Crete. The sixth heat was won easily by Crete, with Ethel Lambert second and Tetis

third. The latter behaved rank, and was evidently not at her best. Glencoe Wilkes did not start to-day, being out of fix, and Country Boy was ruled out. The latter got fourth money, however. The summary :

3.00 Class. Purse, \$300.

Crete, ch. m., C. H. Flagg, Manchester .	1	4	5	5	1	1
Thetis, b. m., R. E. Foster, Webster .	2	1	4	1	4	2
Ethel Lambert, ch. m., C. G. Blanchard, Concord	3	2	1	2	2	2
Country Boy, b. g., L. E. Marston, Pitts- field	4	3	2	4	3	ro
Glencoe Wilkes, b. h., F. L. Gerald, Laconia	5	5	3	3	dr.	
Time — 2.39, 2.39½, 2.40, 2.38½, 2.38, 2.40.						

The first event on the regular programme was the two-year-old colt stakes. There was a big nomination for this, but the phenomenal speed shown by Lord Brino at Mystic Park, where he made a record of 2.32¼, frightened many out, and there were but four starters. As expected, Lord Brino won the race, but not until New Flower gave him quite a scare in the first heat.

J. H. Taylor replaced G. W. Silver as a driver behind New Flower in the second heat, but the Woodbrino colt had too much speed and steadiness, and the change worked no difference in the result. Much Ado trotted even miles, and impressed everybody as being a very likely colt. The summary :

Foals of 1889. Stake value, \$225.

Lord Brino, blk. c., by Woodbrino, dam by Ballard, S.		
F. Ham, Portsmouth	. 1	1
New Flower, b. c., by Nephew, 1220, dam by Elec- tioneer, G. W. Silver, Penacook	. 2	2
Much Ado, b. c., by Judge Salisbury, dam by Sim- mons, 228, W. F. Daniell, Franklin	. 3	3
P. L. K., blk. c., by Volunteer Boy, dam by Prescott's Hambletonian, P. L. Kennedy, Franklin Falls	. 4	4
Time — 2.46, 2.46.		

Another phenomenon did the scare act in the three-year-old stakes. This was Queen Esther, winner of the three-year-old at the New England Breeders' meeting. She was picked for a sure winner. It turned out that she couldn't go a bit and President Daniell's great filly, Edith H., had a walk-over. Queen Esther was stiff and sore and either couldn't or wouldn't trot. The race was scarcely more than a good jog for Edith H. who can trot her miles in 2.35. The summary :

For foals of 1888. Stake value, \$275.

Edith H., g. f., by Deucalion, dam by Nutbourne, W.

F. Daniell, Franklin	1	1
Whirlwind, b. c., by Glencoe Wilkes, dam by Robert Allen, G. F. Kelley, Lower Gilmanton	2	2
Queen Esther, b. f., by Viking, dam s. t. b. by Gideon, F. H. Foster, Tilton	3	4
Kingman, b. c., by Viking, dam by Edward Everett, L. D. Marston, Pittsfield	4	3
Time 2.49½, 2.50.		

The 2.29 class wound up the programme. Falcon, Jr., won the first heat in the slow time of 2.34½, and people wondered what was in the wind. They found out when Johnny Knott captured the next three heats straight and the race without even being extended. Falcon, Jr., was plainly "off." Levi Ray drove Highland Queen a good race. The summary :

2.29 Class. Purse, \$300.

Johnny Knott, b. g., by Little Moak, N. J.

Stone, Manchester	2	1	1	1
Falcon, Jr., b. h., by Falcon, Sam Hodson, Meredith	1	2	2	2
Highland Queen, blk. m., by Highland Gray, Stevens & Eaton, Lancaster	3	3	3	3
Time—2.34½, 2.29¾, 2.34¾, 2.31.				

The judges of the afternoon were Dr. J. H. Riedell of Manchester, starter; H. R. Lawrence, and C. H. Bowles.

Between the heats Stornaway trotted exhibition miles in 2.36, 2.32 $\frac{3}{4}$; and Montrose, owned by R. E. Foster of Webster, a mile in 2.36 $\frac{1}{4}$. Gregorio and stock were also shown on the track and won much admiration.

THIRD DAY.

The third and last day of the breeders' meeting opened with a pouring rain that the weather-wise all pronounced the long delayed equinoctial storm. The clouds began to lift during the forenoon, and at noon the sun was shining brightly. The rain, however, had made its inroad on the attendance, for when the weather cleared it was too late for visitors from distant points to reach the grounds. The judges completed their work in the stock department during the forenoon. The brood mares and colts were first brought out, and their appearance in the show ring attracted great interest. It was the finest lot of mares and colts ever paraded in New Hampshire.

The awards were as follows:

Brood Mares under Eight Years Old.

1st, Clara K. Nelson, ch. f., by Nelson, 2.10; dam Nabby Day, by son of Ballard's Cassius M. Clay, Jr., 54. Entered by C. C. Kenrick, Franklin Falls. 2d, Clytie Wilkes, b. m., by Mambrino Wilkes; dam by Blaisdell Horse. Entered by J. S. Blanchard, Concord, and C. H. Fitz, Webster. 3d, Daisy Wilkes, ro. f., by Mambrino Wilkes; dam by Honest Allen, Jr. Entered by Grasmere Stock Farm, Goffstown.

Class F, Brood Mares Eight Years Old or Over.

1st, Virtu S., b. m., by Champion, son of King Patchen; dam Virgo S., by Middletown. Entered by I. W. Springfield, South Wolfborough. 2d, Roxie J., blk. m., by Almont Eclipse; dam (the granddam of C. C. K., 2.24 $\frac{1}{4}$), by Ethan, Jr., son of Honest Allen. Entered by A. R. Ayers, North Boscawen. 3d, Fairy, b. m., by Florida, 482; dam Ayer mare by Dad. Entered by Merrill Perry, Salisbury.

Next came the standard bred foals of 1891, and this was another hot lot. Every colt had to be a registered animal and the ribbon takers had reason to feel proud. The awards:

Class G, Standard-bred Foals of 1891.

1st, Nellie, blk. f., by Mambrino Wilkes, 2.28 $\frac{3}{4}$; dam Kate Shaw, by Gen. Lyon, 493. Entered by Hale P. Shaw, Salisbury Centre. 2d, Lamberta Viking, ch. f., by Viking, 2.19 $\frac{1}{4}$; dam Daisy Lambert. Entered by J. S. Blanchard, Concord.

The last class examined were the single drivers, and as there were but two shown, little trouble was experienced in reaching a choice. The award:

Class H, Driving Horses.

1st, Highland Queen, 2.36 $\frac{1}{4}$, blk. m., by Highland Gray, 824; dam by Gen. Sherman, 862. Entered by Mt. Washington Stock Farm, Lancaster. No second premium awarded.

At 1 o'clock P. M., the grand parade of stock on the track, postponed from Wednesday, took place, and no such a sight was ever witnessed before in this State. Horsemen present pronounced it one of the grandest shows of blooded horses they ever saw anywhere. Not only were the animals highly bred but they were great, individually. The parade was led by the kingly Viking and his stock, and it was the universal opinion that a finer family show of colts and trotters was never made in the North. Viking looked in far better form than he did at the New England Breeder's meeting, where he trotted eight heats on sheer pluck and won one of the greatest stallion races on record. It was probably the last race he will ever appear in, though it is not unlikely that he may be fitted some day to beat his record. Mr. Foster, his owner, believes that he is in shape to do this at the present time. As the stock passed in review before the grand stand, the animals were described by George G. Brown, of Tilton. The blue ribbon winners attracted especial notice.

Among those who enjoyed the exhibition was the Hon. Chas. E. Tilton, to whom the New Hampshire Horse Breed-

The stallion race was the second event. This had three starters and none of them seemed to be able to trot much. John B. Clarke was the favorite and was a winner in slow time. He has been acting well in his work, going a mile a few days ago in 2.41, but he was not in shape to-day. The others were even worse off. The winner is a great gaited colt and in somebody's hands ought to make a trotter. The summary :

Guaranteed Purse, \$300, for 2.40 Stallions Owned by Members.

John B. Clarke, g. h., by Mambrino Wilkes, George

A. Brown, Contoocook 1 1 1

Harry Lambert, b. h., by Daniel Lambert, C. G.

Blanchard, Concord 2 2 2

Fleetwood, b. h., by Stockwood, C. C. Kenrick,

Franklin Falls 3 3 3

Time — 3.05, 2.55 $\frac{3}{4}$, 2.56 $\frac{1}{2}$.

The 2.45 class wound up the meeting. Gracie was a big favorite in this and won as she pleased. Homer Wilkes behaved badly and disappointed his friends, who had played him for second place, Country Boy beating him out. The summary :

Guaranteed Purse, \$300, for 3.00 Class.

Gracie, b. m., by Redwood, I. W. Springfield,

South Wolfeborough 1 1 1

Country Boy, b. g., by Highland Lad, L. E. Mars-

ton, Pittsfield 2 2 3

Homer Wilkes, g. g., by Mambrino Wilkes, E. F.

Wilson, Manchester 3 3 2

Keplar P., b. h., George Hall, Concord 4 4 4

Time — 2.42 $\frac{1}{2}$, 2.40, 2.39 $\frac{1}{2}$.

All purses and premiums will be paid promptly by the treasurer of the association, John S. Blanchard, of Concord. Many received their money to-day. Bad weather hurt the

financial interests of the meeting, but the association is not discouraged. It will hold another meeting next year, a month earlier in the season, and will try and surpass the splendid show just closed. Everybody proclaims this meeting a success and of immeasurable value to the horse breeding interests of the State.

W. C. CLARKE,
Secretary.

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BULLETIN NO. 11.*

FEEDING EXPERIMENTS WITH PIGS.

PART I.

The work reported in this bulletin was designed to show something of the feeding or pork-producing value of skim-milk, a matter of no small importance in connection with

*The following bulletins have been issued by Director G. H. Whitcher, of the Experiment Station, since our previous report was made, and are of such value that we continue the practice of publishing them entire.

dairy farming. Within our State to-day, there are probably 100,000 cows, producing 300,000,000 pounds of milk, of which about three fourths, or about 225,000,000 pounds, is made into butter. Now, on an average we get not far from eighty per cent of the whole milk as skimmilk, consequently the annual quantity of skimmilk that the farmers of New Hampshire have to dispose of is 180,000,000 pounds, and if this is worth twenty-five cents per hundred it represents a value of \$450,000.

While the original plan of these experiments covered only the financial side of the question, later it was found desirable to conduct digestion experiments to determine just how much of the food eaten was actually utilized by the pigs. This work was put into the hands of the Station chemist, Professor Morse, whose report is to be found in Part II of this bulletin.

The six pigs selected for this work were bought of a neighboring farmer, August 24, 1889, at which time they were six weeks old. While of no particular breed, they evidently had a good proportion of Chester White blood, and proved rapid growers, and were remarkably uniform in shape and weight.

August 24 each pig was marked and his weight recorded, and at the same time they were divided into two lots, as follows:

	No. of Pig . . 1	2	3	
Lot 1, live weight Aug. 24,	28	25½	28½	Total, 82
	No. of Pig . . 4	5	6	
Lot 2, live weight Aug. 24,	26	32½	25	Total, 83½

During the preparatory period, from August 24 to September 3, each lot received daily thirty pounds of skimmilk, and at the last named date lot 1 weighed 96½ pounds, while lot 2 weighed 106 pounds.

PLAN OF THE FEEDING WORK.

To place the two lots on as equal a basis as possible it was decided that each should be fed a like amount of digestible matter daily — that is, the total amount of digestible albuminoids and non-albuminoids in the two rations should be as nearly alike as possible — but in one case the source of this

digestible matter should be skimmilk and corn meal, while in the other it should be corn meal and middlings, with water added. Of course the only possible basis upon which to compute such rations was the "feeding standards" and "feeding tables," and to utilize these it was necessary to assume that the skimmilk, corn meal, and middlings were to be of average quality and digestibility. Luckily, subsequent analyses of the foods used and determination of digestibility, did not show enough variation to affect the results in any way.

The amount of food required was estimated each week, from Wolff's "feeding standards," with a slight modification as to quantity. For one hundred pounds live weight there was fed daily an amount of food which would contain, for

Lot 1.	{	.536 pounds albuminoids.
	{	3.36 pounds non-albuminoids.
Lot 2.	{	.53 pounds albuminoids.
	{	3.33 pounds non-albuminoids.
Wolff's standard is	{	.40 of albuminoids.
	{	2.40 of non-albuminoids.

The ratio of albuminoids to non-albuminoids (nutritive ratio) is practically the same as Wolff's, but the total digestible matter daily for one hundred pounds live weight is 3.86 pounds as against 2.80. This excess is apparently greater than is actually the case, owing to the way in which the live weight was estimated in advance.

The pigs were weighed individually each week, and the ration for the succeeding week was figured, not on the actual weight at the commencement of the week, but upon an estimate of what each lot would weigh at the end of the week; this was done by adding to the actual weight an amount equal to the average gain of both lots for the preceding week; as a matter of fact, therefore, the quantity of food was always figured for a greater live weight than actually existed. A better way, doubtless, and one adopted in another experiment, would have been to have added one half of this gain, thus figuring the ration on approximately the average live weight for the week. On the other hand, it may be reasonably urged that so long as the food was consumed without waste it was

evident that these particular pigs, at least, were so constituted that they could handle more than Wolff's standards call for.

HOW THE RATIONS WERE COMPUTED.

As already mentioned, it was decided to make the grain ration a mixture of equal parts of corn meal and wheat middlings, as this mixture would have a nutritive ration of 1 : 6.5, which was exactly what was desired. A sufficient amount was then taken to meet the requirements for the live weight involved, estimated as above explained.

The lot not having the mixed grain were to have such a mixture of skimmilk and corn meal as should give exactly the same amount and proportion of digestible matter. It was found that one part of corn meal and two parts of skimmilk gave nearly the right proportion, or nutritive ratio, and in general this was the combination fed.

As the feeding progressed, samples of the foods were analyzed, and when it was observed that the skimmilk ration invariably gave the greater growth, the digestibility of each constituent of the food was determined, as reported in Part II, where will be found the "Composition of Feeding Stuff," Table I, page 11; "Composition of Dung," Table II, page 12; and "Digestion Coefficients," Table IV, page 13.

The following table (I) is computed from the total composition and the digestion coefficients given in Part II, and is in the form which I have used for the last six years in feeding tables; the first column gives the digestible albuminoids, the second the non-albuminoids made up of digestible nitrogen-free extract, fibre, and fat, the latter multiplied by $2\frac{1}{2}$ to place it on a starch basis:

TABLE I.

100 pounds.	—Digestible—		Nutritive ratio.
	Albuminoids.	Non-albuminoids.	
Corn meal contain . .	7.92	76.91	1 : 9.7
Middlings contain . .	14.82	64.30	1 : 4.3
Skimmilk contain . .	3.29	5 82	1 : 1.8

TABLE II.—Lot 1.

Period.	Week.	Live weight.	DAILY RATIONS.				Gain, live weight.	Gain, per 100 lbs. live weight.	Ditto, averaged for period.	Cost of 1 lb. of gain, assuming skimmilk to be 25c. per cwt.	Ditto, averaged for period.	Digestible dry matter per 100 lbs. growth.
			Skimmilk.	Corn meal.	Middlings.	Water.						
1 Sept. 3-24.	1	lbs. 96½	lbs. 7	lbs. 3½	12	11.7	15.6	.0306	.0258	179
	2	108½	9	5	....	....	22	18.4		.0230
	3	130½	12	6	....	....	24	16.8		.0263
2 Sept. 24 to Oct. 15.	4	154½	4	4	10	19	11.6	11.5	.0340	.0380	271
	5	173½	....	5	5	10	22	11.9		.0365	
	6	195½	....	6	6	15	22½	10.9		.0430	
3 Oct. 15 to Nov. 15.	7	218	17	10	30½	13.1	11.7	.0327	.0350	243
	8	248½	19	10½	....	....	28	10.7		.0375
	9	276½	22	11	....	....	33½	11.4		.0344
4 Nov. 5 to Dec. 10.	10	310	9	9	*30	34½	10.4	7.8	.0420	.0560	398
	11	344½	....	10	10	34	28½	7.9		.0565	
	12	373	....	10½	10½	38	30	7.7		.0562	
	13	403	....	10½	10½	38	27½	6.6		.0615	
	14	430½	....	11½	11½	37	27½	6.2		.0672	
5 Dec. 10 to Jan. 14.	15	458	36	17	46	9.6	8.5	.0396	.0434	304
	16	504	36	20	....	*2	49½	9.4		.0410	
	17	553½	37	22	....	3	51½	8.9		.0425	
	18	605	37	22	....	3	42	6.7		.0520	
	19	647	39	23	....	4	53	7.8		.0432	

TABLE II.—Lot 2.

Period.	Week.	Live weight.	Skimmilk.	Corn meal.	Middlings.	Water.	Gain, live weight.	Gain, per 100 lbs. live weight.	Ditto, averaged for period.	Cost of 1 lb. of gain, assuming skimmilk to be 25c. per cwt.	Ditto, averaged for period.	Digestible dry matter per 100 lbs. growth.
1 Sept. 3-24.	1	lbs. 106	2½	2½	6	8	7.3	13.1	.0503	.0316	225
	2	114	....	3½	3½	8	16½	13.5		.0342	
	3	130½	....	4	4	10	26½	18.5		.0243	
2 Sept. 24 to Oct. 15.	4	157	12	6	16	9.7	15.3	.0394	.0270	189
	5	173	14	8	....	....	31½	16.6		.0256
	6	204½	16	10	....	....	42	18.6		.0233
3 Oct. 15 to Nov. 5.	7	246½	7	7	16	25	9.7	9.2	.0452	.0460	328
	8	271½	....	7½	7½	18	24½	8.7		.0493	
	9	296	....	8	8	20	29	9.3		.0445	
4 Nov. 5 to Dec. 10.	10	325	27	14	*6	50½	14.4	11.1	.0287	.0363	252
	11	375½	30	16	....	7	40½	10.2		.0406	
	12	416	33	18	....	8	41	9.5		.0448	
	13	457	33	18	....	8	41	8.6		.0448	
	14	498	36½	19½	....	8	68	12.8		.0295	
5 Dec. 10 to Jan. 14.	15	566	14	14	46	34½	5.9	5.3	.0650	.0633	450
	16	600½	....	15	15	45	45	7.2		.0537	
	17	645½	....	16	16	48	41½	6.2		.0620	
	18	687	....	16	16	48	27½	3.9		.0936	
	19	714½	....	8½	8½	25	25½	3.5		.0502	

* Extra water in both lots.

In Table II are given the details of the rations used; the first, second, and third periods are of twenty-one days each, while the fourth and fifth are of thirty-five days each. The lots were alternated from the skimmilk and corn meal ration to the mixed grain ration, and *vice versa* at the beginning of each period, thus equalizing any variation in the natural thriftiness of the two lots.

Table II is arranged as follows: Commencing at the left, the first column gives the period and date covered; the second column gives the number of the week since the experiment commenced; the next four columns give the kind and amount of food fed per lot daily; the gain per week for each lot comes next; then the gain figured to one hundred pounds of live weight, followed by the same averaged for the entire period; in the next column is given the cost per pound of growth for each week. In order that this might be figured out it was necessary to assume some value for skimmilk, and I have taken this at twenty-five cents per hundred pounds; following this is the average per period.

This table contains the more important results of the experiment. The most noticeable thing about it is the superiority of the skimmilk and corn meal ration over that made up of corn meal and middlings, notwithstanding the fact, as will be shown later, that the former ration did not contain as much digestible matter as the latter.

TABLE III.

PERIOD.	LOT 1.				LOT 2.			
	Average gain per week for each 100 lbs. live weight.		Average cost per pound of growth.		Average gain per week, for each 100 lbs. live weight.		Average cost per pound of growth.	
	Skim-milk.	Mix'd grain.	Skim-milk.	Mix'd grain.	Skim-milk.	Mix'd grain.	Skim-milk.	Mix'd grain.
	lbs.	lbs.	cts.	cts.	lbs.	lbs.	cts.	cts.
1.....	15.6		2.58			13.1		3.16
2.....		11.5		3.8	14.9		2.70	
3.....	11.7		3.50			9.2		4.60
4.....		7.8		5.6	11.1		3.63	
5.....	8.5		4.34			5.3		6.33

Table III is condensed from Table II for the purpose of showing that this superiority is a decided one, both as to rate of growth and cost of growth.

A glance will show that the growth per one hundred pounds of live weight is much larger in each lot when the ration is skim milk and corn meal than when it is corn meal and middlings, and it is likewise noticeable that this gain decreases with the same ration as the pigs grew older. It is also evident that the cost of growth follows the same rule, being lowest when the gain is greatest.

The following averages were obtained during the one hundred and thirty-three days covered by this work :

	Lot 1.	Lot 2.
Average weekly gain for 100 pounds live weight, on skim milk ration .	11.3	12.5
on mixed grain ration	9.2	8.5
	10.4	10
Average cost of 1 pound of growth, on skim milk ration.	3.9	3.4
on mixed grain ration . . .	5.1	5.3
	4.4	4.5

The figures for the skim milk and corn meal ration are put in black faced type, and it is at once seen that the rate of gain was unmistakably greater on the skim milk and grain than on grain alone, the percentage in favor of the former being 23 and 47 on lots 1 and 2 respectively, while the cost of growth on lots 1 and 2 was 1.2 cents and 1.9 cents greater per pound when the food was mixed grain; this difference is well worthy of careful consideration. With grain costing, as this did, \$20 per ton for corn meal and \$26 for middlings, such pigs as these were, cannot be fed without loss when pork sells at four cents alive, or five cents dressed.

With skim milk, however, the case is different, for two reasons :

First, less "raw material"—that is, digestible matter—is required to produce a pound of growth, as shown below :

DIGESTIBLE MATTER PER HUNDRED POUNDS OF GROWTH.

Average digestible dry matter required to produce 100 pounds gain :

	Lot 1.	Lot 2.
Skimmilk and corn meal	242	220½
Meal and middlings	334½	334½
Average for entire time	279	288¾

Secondly, because with skimmilk and corn meal a greater quantity of food can be handled daily. Thus, by both of these factors the time required for producing a two hundred pound pig is reduced very materially. This point is not sufficiently appreciated by many who feed pigs. With the present prices there is but one way in which pork can be produced at a profit, and that is by producing a two hundred pound pig in the shortest possible time.

We see from Table II that the cost of growth and the amount of food required to produce one hundred pounds of growth, increase as the pigs grow older, and it would have been much more profitable to have sold them when averaging one hundred and seventy-five pounds each, than when averaging two hundred and forty pounds.

Thus far we have, for convenience, figured all results on the assumption that the skimmilk used was worth twenty-five cents per hundred pounds.

TABLE IV.

PERIOD.	LOT 1.					LOT 2.				
	Value of gain for period, at 4 cts. per lb.	Value of corn meal fed.	Value of skimmilk by difference.	Amount of skimmilk fed.	Value of skimmilk per 100 pounds.	Value of gain for period, at 4 cts. per lb.	Value of corn meal fed.	Value of skimmilk by difference.	Amount of skimmilk fed.	Value of skimmilk per 100 pounds.
1.....	\$2.32	\$1.01	\$1.31	lbs. 196	cts. 67				lbs.	cts.
2.....						\$3.58	\$1.68	\$1.90	294	64½
3.....	3.68	2.20	1.48	406	36½					
4.....						9.64	5.98	3.62	1,116	32½
5.....	9.68	7.28	2.40	1,295	18½					
Total average...	15.68	10.49	5.19	1,897	27½	13.22	7.66	5.56	1,410	39½

We will now see what its value actually was under the conditions of this experiment, the price of live hogs being four cents per pound, and the cost of grain as previously mentioned.

For our present purpose, we will neglect the first cost of the pigs and note the value of the gain of live weight for each period, where skimmilk was used as a part of the ration.

This table is constructed by determining the value of the gain for each skimmilk period and subtracting therefrom the cost of the corn meal which was fed with the skimmilk, the remainder represents the value of the skimmilk, which divided by the amount, gives the value per hundred pounds. The showing is certainly a favorable one, and with thrifty pigs from twenty to thirty cents per hundred ought to be and can be realized for skimmilk, when live hogs sell at four cents per pound. It must be constantly kept in mind, however, that they must be sold by the time they reach a live weight of from two hundred to two hundred and thirty pounds.

FEEDING WITH GRAIN ALONE.

Table V gives the results of feeding with corn meal and middlings.

TABLE V.

PERIOD.	LOT 1.			LOT 2.		
	Value of gain at 4 cts. per pound.	Cost of grain fed.	Cost of grain per pound.	Value of gain at 4 cts. per pound.	Cost of grain fed.	Cost of grain per pound.
1				\$2.04	\$1.61	\$0.031
2	\$2.54	\$2.41	\$0.038	3.14	3.61	.046
3	5.92	8.29	.056	6.96	11.02	.063
4						
5						
Total average	8.46	10.70	.050	12.14	16.25	.053

This table seems conclusive, so far as these pigs were concerned, and we are obliged to say that on grain alone there was a loss of more than one cent for every pound of growth.

These results show us that we cannot blindly follow the teachings of feeding tables, for should we so do one of these rations would be as good as the other; but as a matter of fact, while chemically the skim milk ration was not quite as rich in nutritive material as the grain ration, yet the former was, on an average, thirty per cent more efficient in actual results than the latter.

PART II.

DETERMINATION OF DIGESTIBILITY OF RATIONS.

F. W. MORSE.

The comparative digestibility of the two rations was determined as follows:

One pig from each lot was taken and placed in a box or cage, so constructed that the food would not be wasted and none of the dung would be lost.

The pigs did not seem to mind this confinement and continued to gain in weight as before the beginning of this part of the experiment. Fortunately, the weather was mild and no wide variation in temperature occurred during this period.

The food for each was weighed night and morning, and samples taken at each weighing for subsequent analysis. Equal parts of the morning and evening samples of skim milk were mixed together and analyzed on the following day, before it became sour. Equal parts of the daily samples of corn meal and middlings were mixed together, and at the close of the experiment a small sample was drawn from each for analysis. By this means the average composition of each food stuff was determined. This composition is given in the following table:

TABLE I.

	Water.	Dry matter.	Ash.	Ether ex- tract.	Crude pro- teine.	Crude fibre.	Nitrogen- free ex- tract.
Corn meal.....	14.22	85.78	1.71	3.35	9.23	1.54	69.45
Middlings	12.30	87.70	3.09	3.89	16.75	2.67	61.30
Skimmilk	90.61	9.39	0.77	0.33	3.29		5.00

The pigs were carefully watched both day and night, and the dung was collected and put into glass jars. The dung was weighed each day, and at the close of the period was placed in a large porcelain dish and dried as quickly as possible, until it was in a condition to be mixed together thoroughly, when a small sample was taken for an analysis.

The composition of the dung of each pig is shown in the following table :

TABLE II.

	Water.	Dry matter.	Ash.	Ether ex- tract.	Crude pro- teine.	Crude fibre.	Nitrogen-free extract.
Pig A.....	68.55	31.45	4.41	2.43	6.62	4.28	15.71
Pig B.....	67.14	32.86	7.11	3.86	8.24	2.93	10.72

During the digestion period, pig A consumed twenty-two pounds and five ounces of corn meal, twenty-two pounds and five ounces of middlings, together with eighty-four and one half pounds of water, and voided ten and ninety-three one hundredths pounds of dung.

Pig B consumed forty-two pounds of corn meal, seventy-seven pounds skimmilk, and twenty-one pounds of water, and voided six and sixty-seven one hundredths pounds of dung. From these figures and the composition of the food stuffs and dung, is calculated the following table, showing the amount

of each nutrient eaten, voided, and digested; the amount digested being the difference between the amount eaten and the amount obtained in the dung.

TABLE III.

	PIG A.			PIG B.		
	Consumed.	Voided.	Digested.	Consumed.	Voided.	Digested.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Water.....	90.41	7.49		96.74	4.48	
Dry matter	38.71	3.44	35.27	43.26	2.19	41.07
Ash	1.07	.48	.59	1.31	.47	.84
Ether extract	1.63	.26	1.37	1.87	.26	1.61
Crude proteine.....	5.80	.72	5.08	6.41	.55	5.86
Crude fibre .....	.94	.47	.47	.65	.19	.46
Nitrogen-free extract.....	29.17	1.72	27.45	33.02	.71	32.31

By this table it is shown that pig B, on the skimmilk ration, consumed more food than pig A, and digested more of each nutrient. This difference amounted in all to five and eight tenths pounds of dry matter. He also gained two and twenty-five one hundredths pounds more in live weight than pig A.

The pigs were weighed each day, at the same hour, and showed a continued increase in weight, amounting in all to three and seventy-five one hundredths pounds for pig A, and six pounds for pig B.

Pig A did not eat readily, and on two occasions his daily rations had to be reduced below that originally planned for him. Pig B ate freely at each feeding and consumed the full ration planned for the experiment, and apparently would have eaten more if it had been given him. This fact was probably owing to the greater digestibility of the ration.

This greater digestibility of the skimmilk ration was noticeable for each nutrient; but especially so for the crude fibre, as the following table of percentages of digestibility will show :

TABLE IV.

	Dry matter.	Ether extract.	Crude proteine.	Crude fibre.	Nitrogen-free extract.
Pig A	91.11	84.04	87.58	5.00	94.10
Pig B	94.93	86.09	91.42	70.77	97.85

To be sure the crude fibre does not occur in large quantities in the food of pigs, yet there was a difference in the dung of the two pigs, apparent to the eye. The dung from pig A was dry and hard, and contained many undigested hulls or scales from the middlings and corn meal, while pig B passed a soft dung.

The nutritive ratios calculated from the actually digested nutrients vary but slightly in the two rations, being 1 to 6.17 for the corn meal and middlings, and 1 to 6.27 for the corn meal and skimmilk.

CONCLUSIONS.

1. For each one hundred pounds of live weight, eight pounds of skimmilk, and four pounds of corn meal make an ample and well proportioned daily ration.
2. In the absence of skimmilk, two and one half pounds of middlings, and eight pounds of water, will give an equal amount of nutritive matter.
3. One hundred pounds of digestible matter in the skimmilk and corn meal ration, was equal to one hundred and forty-six and six tenths pounds, in the corn meal and middlings ration.

4. The superiority of the skimmilk ration is due in part, doubtless, to its greater digestibility; but still more, in my opinion, to the fact that there is less waste matter — that is, indigestible matter — to be carried through the system, and to the noticeable difference in the character of the dung, mentioned by Professor Morse in Part II of this bulletin. The pigs, on mixed grain invariably grew constipated, while those on skimmilk were not so affected.

5. The cost of a pound of gain on skimmilk and corn meal, was three and six tenths cents; on mixed grain ration, five and two tenths cents.

6. Digestible dry matter required to produce one hundred pounds of gain of live weight on skimmilk and corn meal, two hundred and thirty-one pounds; on mixed grain, three hundred and thirty-four and one half pounds.

7. { Lot 1, when dressed, shrunk 19.6 per cent.
 { Lot 2, when dressed, shrunk 18.4 per cent.

8. Calling skimmilk worth twenty-five cents per hundred, and we get the following balance sheet, on the basis of the cost as given in "Conclusion No. 5":

30 lb. pig, first cost	.	.	.	.	.	\$2.00
170 lbs. of growth on skimmilk and corn meal at 3.6 cts.						6.12

200 lb. pig cost	\$8.12
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which equals 4.06 cents per pound.

30 lb. pig, first cost	\$2.00
170 lbs. of growth on corn meal and middlings at 5.2 cts.						8.84

200 lb. pig cost	\$10.80
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which equals 5.42 cents per pound.

BULLETIN No. 12.

FERTILIZER EXPERIMENT.

The fertilizer experiments for the season of 1890 were in part a continuation of similar work, which has been reported on before, and in part a new line of work, relating more especially to the use of manures, prepared fertilizers, chemicals, and ashes on a crop of ensilage corn; I am convinced that there is room for a considerable saving in the purchase of *plant food*, as well as a possibility of more economical uses of manures, and I can only hope that the suggestions given, and the conclusions drawn from the work, will be thoroughly tested by the farmers of the State, for they are of use and value only as they are put to the test on various soils and under existing conditions. Unless tried they are of no value to those for whom the work has been and is being done.

From those who have tested the merits of the combinations first sent from this college in 1885, and not materially modified since that time, there is testimony that convinces me that the general combination recommended for corn is substantially what is required for our soils, and from Massachusetts and Vermont I receive similar testimony; but while every new test adds to the probability of the correctness of my position relative to the need of vastly more potash than our fertilizer manufacturers give us, yet farmers must in the end satisfy themselves by trial on their own soil; and there is no possibility of loss resulting from this trial with every probability of gain.

TABLE I.

		NUMBER OF PLOT.																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Kind of Fertilizer.	Dissolved bone-black.....	bu.	lbs.	lbs.	lbs.	lbs.	Nothing.	lbs.	lbs.	lbs.	lbs.	bu.	Nothing.	lbs.	lbs.	lbs.	lbs.	Nothing.	lbs.	lbs.	lbs.	
	Muriate of potash.....		18½	24¼	14			17½		17½	16½			16½		18½	10½				33½	
	Sulphate of ammonia.....		3¾	6		17¼			8¾	5	5			5		3¾	9½			22¼		
	Ashes.....		3¾		7¼	2¾		1		3½		2		3½		3¾	3¼		12½			
	Manure.....	35																				
	Stockbridge.....							26								28						
	Bowker, Hill and Drill.....																					
	Bradley XL.....								26													
Analyses.	Phosphoric acid, per cent..	.23	11.4	12.8	10.5			10.7	11.8	10.5	10.5	1.5		10.5	12.4	11.4	7.2				16	
	Potash, per cent.....	.48	7.0	10.0		43.5		5.0	2.1	16.0	10.0	6.5		10.0	2.0	7.0	20.4			50		
	Nitrogen, per cent.....	.48	2.8		6.8	2.8		4.0	2.5	0.7	2.8			2.8	2.5	2.8	2.8		20			

TABLE II.

NUMBER OF PLOT.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Yield in bushels per acre.....	238	224	206	114	132	96	194	150	190	234	130	94	186	190	204	220	92	90	124	124
Gain over average of plots with no fertilizer, bushels.....	144	130	112	20	38	....	100	56	96	140	36	....	92	96	110	126	....	4	30	30
Value of crop, at 50 cents per bushel..	\$119	\$112	\$103	\$57	\$66	\$48	\$97	\$75	\$95	\$117	\$65	\$47	\$93	\$95	\$102	\$110	\$46	\$45	\$62	\$62
Value of gain over plots with no fertilizer	72	65	56	10	19	....	50	28	48	70	18	....	46	48	55	63	....	....	15	15
Value of gain for \$1 invested in fertilizer	3 60	6 50	5 60	1 00	1 90	....	5 00	2 80	4 80	7 00	1 80	....	4 60	4 80	5 50	6 30	....	....	1 50	1 50

CHEMICALS FOR POTATOES.

The coöperative work carried on in 1889 was not continued, except in a single case, as there are few who are willing to devote the necessary time and trouble to the laying out of plots, and more especially to the weighing of the harvested crop. The exception above noted was a series of tests on potatoes, carried on by Mr. S. B. Whittemore, of Colebrook, in the heart of the potato region of New Hampshire, and the results are of interest and value to every man who contemplates purchasing fertilizers for use on this crop.

The combinations of chemicals were the same as those sent out in 1889, and in the following table is given the kind and amount of each chemical used per plot of one-twentieth acre, and also the chemical composition of the mixed fertilizer as it would have shown by chemical analysis:

It will be seen from this table that each form of plant food is used by itself (see plots 18, 19, 20), also in combinations of two with the third omitted (see plots 3, 4, 5), and in addition to these the three forms are combined in varying proportions (see plots 2, 9, 10, 13, 15, 16). Plots 2 and 15 are duplicates, as are 10 and 13.

The Station mixed and sent out all the chemicals, and also the prepared fertilizer, for plot 14, using an amount on each plot which would, at the prices then asked, cost ten dollars per acre. The prepared fertilizers used on plots 7 and 8 were selected by Mr. Whittemore from the local market, and whether the cost was more or less than ten dollars per acre I am unable to say; it is probable, however, that two pounds more of Bradley's XL should have been used, as its selling price is usually the same as that of Bowker's H & D. Two bushels of ashes were used, on the supposition that they cost twenty-five cents per bushel, which is the average price for unleached ashes, and thirty-five bushels of manure were selected because that amount would give what our farmers consider a good dressing, namely, seven cords, or twenty loads, per acre, the cost of this, however, would be twice the cost of the fertilizer used on the other plots, and this fact must

be kept in mind in comparing results. All the other plots are directly comparable, since there was equal outlay on each.

The lower division of Table I shows the chemical analysis of each form of fertilizer. In the case of the manures and ashes the average of many analyses is taken, and for the prepared fertilizer the average as determined by the Station from samples collected by the Secretary of the Board of Agriculture.

Table II gives the yield per acre; the value of this yield at fifty cents per bushel; also the gain over the average of the four plots with no fertilizer; and the value of the gain due to a dollar's worth of fertilizer of each kind.

That the land on which these experiments were carried on was of uniform quality to start with is shown by the yield of the plots with no fertilizer, these plots being scattered about over the acre:

No. 6, no fertilizer	96 bushels.
No. 12, "	94 "
No. 17, "	92 "
<hr/>	
Average	94 bushels.

(SERIES I.) SINGLE ELEMENTS OF PLANT FOOD.

Plots 18, 19, 20, show what each of the forms of deficient plant food were able to produce on this soil: nitrogen alone, in the form of sulphate of ammonia, yielded ninety bushels, an actual loss over plots with no fertilizer; potash alone, in the form of muriate, yielded one hundred and twenty-four bushels; phosphoric acid alone, in the form of dissolved bone-black, yielded one hundred and twenty-four bushels. A gain in each case of thirty bushels.

So far as this series is concerned, we should be justified in concluding that nitrogen was of no use, and that potash and phosphoric acid are of equal importance, but I wish to express my belief that these tests with only one form of plant food are of very little if any use, but as they are a part of almost every scheme of soil testing I have always put in a set, more to conform to the common custom than from any idea that they would teach anything of much importance.

(SERIES 2.) COMBINATIONS OF TWO ELEMENTS OF DEFICIENT PLANT FOOD.

Plots 3, 4, 5 were designed to show whether either of the three nutritive elements could be dispensed with.

Plot 3, furnished with phosphoric acid and potash, yielded 206 bushels.

Plot 4, furnished with phosphoric acid and nitrogen, yielded 114 bushels.

Plot 5, furnished with potash and nitrogen, yielded 132 bushels.

So far as this series of plots is concerned we have evidence that nitrogen is of the least importance, potash of the most, and phosphoric acid intermediate, and it is clearly the case that phosphoric acid and potash combined give a good crop, well up towards the complete mixtures.

Combining the evidence from series 1 and 2 and we get the following:

			Amount per acre. lbs.	Yield per acre. bu.
(a)	Plot 20.	Dissolved bone-black	. 666	124
	Plot 4.	{ Dissolved bone-black	. 280	114
		{ Sulphate of ammonia	. 145	
	Plot 3.	{ Dissolved bone-black	. 485	206
		{ Muriate of potash .	. 125	
(b)	Plot 19.	Muriate of potash .	. 445	124
	Plot 5.	{ Muriate of potash .	. 345	132
		{ Sulphate of ammonia	. 55	
	Plot 3.	{ Muriate of potash .	. 125	206
		{ Dissolved bone-black	. 485	
(c)	Plot 18.	Sulphate of ammonia	. 250	90
	Plot 4.	{ Sulphate of ammonia	. 145	114
		{ Dissolved bone-black	. 280	
	Plot 5.	{ Sulphate of ammonia	. 55	132
		{ Muriate of potash .	. 345	

Group (a), plot 4, shows that substituting 145 pounds of sulphate of ammonia for 386 pounds of the dissolved bone-black in plot 20, decreases the yield 10 bushels; but in plot 3, substituting 125 pounds of muriate of potash for 181 pounds of the dissolved bone-black gives an increase of 82 bushels.

In group (*b*), plot 5, the substitution of 55 pounds of sulphate of ammonia for 100 pounds of the muriate of potash in plot 19, increases the yield 8 bushels; while in plot 3, replacing 320 pounds of the muriate of potash in plot 19, with 485 pounds of dissolved bone-black increases the yield 82 bushels.

Group (*c*) shows that replacing 105 pounds of sulphate of ammonia with 280 pounds dissolved bone-black added to the yield 24 bushels; and that when 195 pounds of sulphate of ammonia were replaced by 345 pounds of muriate of potash, the increase was 42 bushels.

The three groups show that the greatest yield comes from phosphoric acid and potash (plot 3); the next best from nitrogen and potash (plot 5); the next from phosphoric acid alone (plot 20), and from potash alone (plot 19); the next from phosphoric acid and nitrogen (plot 4); and the poorest from nitrogen alone (plot 18).

(SERIES 3.) COMPLETE CHEMICALS.

In this series three elements of plant food are combined in various ways, the object being to form some idea of the "crop ration" best suited to the conditions of this soil for the potato crop; to this end the method suggested in Bulletin No. 6, of this Station, p. 15, was practised, and in plots 2, 9, 10, 13, 15, and 16, we have combinations of the three fertilizing chemicals which cost the same per acre, but which differ very materially in the proportion of their parts as the per cent of phosphoric acid, potash, and nitrogen, given in Table I, will show.

	Plots.	Analysis.			Yield per acre. bu.
		*P ₂ O ₅ .	K ₂ O.	N.	
(<i>d</i>)	2 and 15	11.4	7	2.8	214
(<i>e</i>)	10 and 13	10.5	10	2.8	210
(<i>f</i>)	16	7.2	20.4	2.8	220
(<i>g</i>)	9	10.5	16	0.7	190

Group (*e*) differs from (*d*) by decreasing the per cent of phosphoric acid and increasing the per cent of potash. So

* P₂O₅ means phosphoric acid; K₂O means potash; N means nitrogen.

far as the average is concerned the yield was slightly decreased by the exchange, but it will be observed that there is a wide difference in the yield of the plots 10 and 13. The cause of this is unknown to me, and while I feel sure that there were some local circumstances which seriously affected plot 13, yet I have averaged it with its duplicate. As a matter of fact, however, I have no doubt but that the yield from group (e) should have been much nearer that of plot 10.

On plot 16, however, where still further reduction of phosphoric acid was made and potash increased, the yield was somewhat increased.

Plot 9 is comparable with group (e) the object was to decrease the nitrogen and increase the potash; this change caused a very decided loss.

Taking these plots together we may fairly infer that 7.2 per cent of phosphoric acid is ample for the soil under consideration, that 20.4 per cent of potash is better than 7, and that 0.7 per cent of nitrogen is not enough.

There is other evidence that shows that some nitrogen is needed.

Take the following plots:

		P ₂ O ₅ .	K ₂ O.	N.	
9 .	.	10.5	16	0.7	yields 190
10 and 13 .	.	10.5	10	2.8	" 210
3 .	.	12.8	10	0	" 206

Now, if we remember that plots 10 and 13 should, without doubt, have averaged more than 210 bushels, we shall see that the substitution of phosphoric acid in plot 3 for *all* of the nitrogen in 10 and 13 resulted in loss, and exchanging the greater part of the nitrogen for potash (see plot 9), also resulted in loss; we must conclude, therefore, that from one to three per cent of nitrogen is needed on soils where potatoes are the first crop in a rotation, but had corn or any crop which had received manure or a nitrogenous fertilizer preceded this potato crop, it is very likely true that nitrogen would not have been needed.

(SERIES 4.) PREPARED FERTILIZERS.

This series, made up of plots 7, 8, and 14, were designed to test the relative merit of \$10 worth of plant food in the best mixed goods, and \$10 worth in chemicals.

No. 7, with 26 pounds of Stockbridge potato fertilizer, yielded 194 bushels.

No. 8, with 26 pounds of Bradley's XL fertilizer, yielded 150 bushels.

No. 14, with 28 pounds of Bowker's Hill and Drill fertilizer, yielded 190 bushels.

The following represents average analyses of these fertilizers:

		P_2O_5 .	K_2O .	N.
Stockbridge,	per cent	10.7	5.0	4.0
Bradley XL,	"	11.8	2.1	2.5
Bowker H. and D.	"	12.4	2.0	2.5

As a means of obtaining a comparative statement of the four series, I have given below a table showing the average result from each series:

Series.	Yield. bu.	Gain over no fertilizer. bu.
1. (Single element of plant food)	113	19
2. (Two elements of plant food)	150	56
3. (Three elements of plant food)	210	116
4. (Prepared fertilizer)	178	84
5. (Ashes)	130	36
6. (Manure)	238	144
7. No fertilizer of any kind	94	

There can be no doubt as to the relative efficiency of series 3 and 4, since the amounts used would cost the same. The thirty-two bushels increase represents an absolute gain due solely to the use of mixed chemicals in place of the best of prepared fertilizers.

The cause of the increased efficiency is easily discerned, for I assume that the prepared fertilizers above mentioned were made from good grade materials, and that the plant food, shown by analysis, was available. The following com-

parison of the average chemical composition of the fertilizers in each series needs little explanation :

	P_2O_5 .	K_2O .	N.
Series 3. (Complete chemicals), per ct.	10.2	11.7	2.5
Series 4. (Prepared fertilizer), per ct.	11.6	3.0	3.0

The conclusion is fully warranted that more potash is needed than the prepared fertilizers furnish.

MANURE AND CHEMICALS COMPARED.

On plot 1 manure was used, as has already been stated, at the rate of seven cords, or \$20 worth, per acre. That is, twice as much in cost as of either of the fertilizers, and while the yield is the largest of any plot, it is only four bushels ahead of plot 10; and if we compare the value of the gain per one dollar of fertilizer, as in the last part of Table II, it will be seen that one dollar invested in manure gave only an increase worth \$3.60, while one dollar invested in complete chemicals gave an increase worth \$5.80, and one dollar invested in the best combination (plot 10) gave an increase worth \$7, and one dollar invested in prepared fertilizer gave an increase worth \$4.20.

Here are figures well worth careful consideration, and they do not stand alone, for in Bulletin No. 10 will be found the report of a duplicate series, made in 1889 by the same party, which shows the same general results, demonstrating the value of such tests when properly carried out.

For the purpose of showing the composition of the fertilizer producing the best results, I have selected those giving the three highest yields as well as the one giving the highest, both from the experiments of 1889 and 1890, and have given below the chemical composition :

		1889.	1890.
Best 3 yields,	P_2O_5 , per cent	11.6	9.7
	K_2O , “	7.1	12.4
	N, “	2.3	2.8
Best yield,	P_2O_5 , per cent	12.8	10.5
	K_2O , “	10.0	10.0
	N, “	.	2.8

CONCLUSIONS.

The above results so fully confirm previous observations, that I shall simply reprint the conclusions given in Bulletin No. 10, of this Station, p. 12 :

1. Chemicals when properly mixed can fully take the place of farm yard manure as a source of plant food.
2. Chemicals when properly mixed can and do give greater increase of crop than commercial fertilizers.
4. The average chemical composition of fertilizers for New Hampshire should be phosphoric acid, 9 to 11 per cent; potash, 9 to 15 per cent; nitrogen, 2 to 4 per cent, whereas, the fertilizers offered to us in the market, average phosphoric acid, 11 per cent; potash, 2.5 per cent; nitrogen, 2.5.

HOW TO GET CHEMICAL FERTILIZER.

Dissolved bone-black, containing 16 per cent of available phosphoric acid; muriate of potash, containing 50 per cent of actual potash; and sulphate of ammonia, containing 20 per cent of nitrogen, are all of the substances required for preparing such fertilizers as will give the best results. These can be bought of any wholesale dealer in, or manufacturer of, fertilizers. They are perfectly harmless substances, as easily and safely mixed as corn meal, shorts, and middlings.

The quantities required per acre will, of course, vary, but from Table I, we may easily get the amount that was actually used per acre on any given plot, by multiplying the quantities given in the table by twenty, for example :

Plot 10 gave best yield; there was used on this at the following rate per acre :

Dissolved bone-black	.	.	.	330 pounds.
Muriate of potash	.	.	.	100 "
Sulphate of ammonia	.	.	.	70 "
				<hr/>
				500 pounds.

For the third time I will reprint the combinations which have now been tested for the past five years :

(Also for potatoes on land where no manure has been used for many years.)

Dissolved bone-black	.	.	.	.	325 pounds.
Muriate of potash	.	.	.	.	100 "
Sulphate of ammonia	.	.	.	.	75 "
					<hr/> 500 pounds.

POTATOES.

(Following a manured crop.)

Dissolved bone-black	.	.	.	.	340 pounds.
Muriate of potash	.	.	.	.	160 "
					<hr/> 500 pounds.

I would only ask the farmers of New Hampshire to try these combinations, even if at some trouble and extra expense, for I am certain that on by far the greater part of our soils, such mixtures will prove superior to the prepared goods as now compounded.

BULLETIN No. 13.

HARDNESS OF BUTTER: THE EFFECT OF FOOD UPON.

A. H. WOOD AND C. L. PARSONS.

It is now commonly admitted that the composition of milk is mainly determined by the breed and individuality of the cow, and that the effect of any normal food upon the percentage of fat contained in the milk is very slight, hence the problem of feeding is, to the milk producer, narrowed to finding the food that will cause his herd to yield the greatest amount of milk at the least cost without injury to the health of his cows. To the maker of butter, however, the problem is still a very broad one; for even if the fat contents of the milk be practically constant and he be able to obtain the maximum quantity

of butter, it may fall far short of the highest quality, on account of the effect of the food upon the composition of the butter fat.

That the composition and characteristics of butter fat are affected by the food of the cow is not new, in fact, it is a matter of common observation and remark; but, without doubt, in many cases greater changes in the quality of butter are attributed to changes in foods than the facts justify.

The study of the effect of foods upon the resulting butter is an important and difficult one, and this bulletin is intended only as a contribution to what has been, and an indication of what may be, learned in this direction.

Within the last few years gluten meal has come into extensive use as a food rich in albuminoids; and as a milk producing food has proved itself one of the best.

As gluten meal is a by-product in the manufacture of glucose from corn and contains all the substance of the original corn, with the exception of the bulk of the starch, it might be expected that it would have a similar effect upon the character of the butter fat when fed to cows in a normal ration.

To test the relative effect of corn meal and its by-product, gluten, in this direction, the following work was carried out: Eight cows were divided into four lots of two each, and were fed alternately upon rations having corn meal or gluten meal as the leading constituent. Each ration was fed continuously for two weeks and the milk given on the last two days in each period was taken to test the effect of the food upon the churnability of the resulting cream, both in regard to time and thoroughness of churning, and also its effect upon the hardness of the butter, its melting point, and its volatile acids.

The cream was obtained from all lots by the use of De Laval hand separator, and allowed to stand twenty-four hours before churning. The cream was apparently sweet when churned, and therefore lower temperatures were maintained than where acid cream is used. Samples of the buttermilk and butter were analyzed, and the comparative hardness of the butters determined by means of the method hereafter described.

In Table A, the black-faced type indicates gluten; the common type, corn meal. The various rations are indicated as 1a, 2a, 6a, and 7a, and were made up as follows:

	1a	7a	2a	6a
	lbs.	lbs.	lbs.	lbs.
Ensilage . . .	44	44	44	44
Hay . . .	6	6	6	6
Corn meal . . .	0	6	1	5
Middlings . . .	3	3	3	3
Gluten . . .	6	0	5	1
Nutritive ratio	1 : 5.2	1 : 9	1 : 5.6	1 : 8

Reference to Table A will show that these four lots of cows were alternated upon these rations, which were constant so far as coarse fodder and one third the grain ration were concerned, and that the substitution of gluten, either wholly or in part, for corn meal, had a marked effect upon the characteristics of the butter fat, decreasing its churnability and softening the product. We would not discourage, on this account, the feeding of gluten to cows, for it has proved itself to be of much value as a milk-producing food, both at this Station (see Bulletin No. 9) and elsewhere. We can only caution against its excessive use with cows that naturally produce a somewhat soft quality of butter, and suggest that mixed with cotton-seed it may very likely be of great advantage, since it may be seriously questioned if cotton-seed in the winter season may not act too strongly in the opposite direction, producing a butter that is too hard.

TABLE A.

Lot.	Period.	Ration.	Nutritive ratio.	Churning temperature, F.	Time churning, minutes.	Fat in butter, per cent.	Hardness of butter, mm. of penetration.	Melting point of butter, degrees C.	Volatile acids equal to c. c. decinormal (OH) ₂ .	Water in butter, per cent.
A	1	1a.	1:5.2	55-58½	14	1.75	8.4	33.8	32.9	9.14
	2	7a.	1:9	56-59	15	.54	6.5	32.4	31.9	9.49
	3	1a.	1:5.2	52-56	25	1.30	11.7	33.2	29.9	9.20
	4	7a.	1:9	52-56	65	.34	6.4	34.0	26.7	9.60
B	1	7a.	1:9	55-59	35	.33	4.5	35.5	33.0	9.18
	2	1a.	1:5.2	56-59½	20	.96	10.9	32.1	31.7	8.87
	3	7a.	1:9	52-56	80	.62	4.9	34.2	29.2	10.00
	4	1a.	1:5.2	53-56	11	1.21	7.7	36.5	25.1	10.82
C	1	2a.	1:5.6	55-57	15	1.58	7.9	34.7	30.4	9.22
	2	6a.	1:8	55-59	30	.58	7.5	33.2	31.6	9.01
	3	2a.	1:5.6	52-56	40	1.05	7.3	33.8	31.4	9.68
	4	6a.	1:8	53-56	30	.53	6.0	33.1	30.0	11.67
D	1	6a.	1:8	55-57	21	1.03	7.1	33.3	32.0	8.65
	2	2a.	1:5.6	56-59½	15	1.85	7.9	32.4	30.9	9.02
	3	6a.	1:8	52-58	4	.81	4.9	33.5	30.3	8.14
	4	2a.	1:5.6	52-56	25	1.22	6.6	32.4	29.5	9.80

TABLE B.

Lot.	Period.	Ration.	Nutritive ratio.	Churning temperature, degrees F.	Time churning, minutes.	Fat in butter, per cent.	Hardness of butter, mm. of penetration.	Melting point of butter, degrees C.	Volatile acids equal to—c. mal Ba(OH) ₂ .	Iodine absorption number.	Water in butter, per cent.
G.	{ 1	4a.	1:7.2	55-57	16	1.73	8.2	31.7	36.2	....	9.48
	{ 2	4a1.	1:7.2	56-58	14	.96	8.7	31.5	36.4	....	9.54
	{ 3	4a.	1:7.2	52-57	32	1.40	7.6	36.1	32.2	....	8.40
X.	{ 1	6a1.	1:8	60	55	.39	8	34.6	29.9	32.4	10.62
	{ 2	6a.	1:8	58	17	.61	9.5	33.1	32.8	32.7	10.06
	{ 3	2a.	1:5.6	53-58	20	....	13	35.7	28.5	38.8	10.93
	{ 4	2a.	1:5.6	48-58	38	1.15	14	34.3	27.8	41.4	14.47
Y.	{ 1	2a.	1:5.6	57	18	.57	13.3	32.6	34	36.8	10.03
	{ 2	2a1.	1:5.6	56-59	115	.37	6	38.7	30	31.7	10.42
	{ 3	2a.	1:5.6	54-57	30	....	9.5	36.9	28	37.9	10.22
	{ 4	2a1.	1:5.6	48-58	150	.69	5	37.4	27.6	31.6	12.93
Z.	{ 1	4a1.	1:7.2	57	13	1.35	10.7	37.6	27.3	36.8	11.36
	{ 2	4a2	1:7.2	57-60	37	.33	6.5	33	31.8	29	11.48
	{ 3	4a1.	1:7.2	54-57	14	....	8.5	32.6	33.9	36.4	11.13

In Table B the lots are also of two cows each, and the periods two weeks. The treatment of milk and cream was the same as previously described, with this exception, that the cream was raised in shallow pans.

Lot G and lot X, in periods 1 and 2, represent a brief test of ensilage as compared with hay, the rations being as follows:

	4a lbs.	4a1 lbs.	6a1 lbs.	6a lbs.
Ensilage	0	44	0	44
Hay	22	6	25	6
Corn meal	3 $\frac{5}{16}$	3 $\frac{5}{16}$	5	5
Middlings	3 $\frac{5}{16}$	3 $\frac{5}{16}$	3	3
Gluten	3 $\frac{5}{16}$	3 $\frac{5}{16}$	1	1
Nutritive ratio . .	1 : 7.2	1 : 7.2	1 : 8	1 : 8

In both lots hay apparently produced a harder butter than did ensilage. While as regards churnability lot G favors hay and lot X ensilage. Lot X, periods 3 and 4, is a change from corn meal to gluten and reaffirms the verdict of Table A. Lot Y shows a test of gluten as compared with cotton-seed, the black-faced type representing the cotton-seed periods. The rations as fed were as follows:

	2a lbs.	2a1 lbs.
Ensilage	44	44
Hay	6	6
Corn meal	1	1
Middlings	3	3
Gluten	5	0
Cotton-seed	0	5
Nutritive ratio . . .	1 : 5.6	1 : 5.6

The effect of the substitution of cotton-seed for gluten is very marked in the hardness of the resulting butter, and corroborates the reports from stations in the South as to the effect in this direction of feeding cotton-seed in quite large quantities. *

Lot Z represents a single test of feeding skimmilk to cows,

* See Bulletin 11, Texas, etc.

and, so far as the butter product is concerned, shows very favorable results. It is, undoubtedly, a good use for skim-milk when not needed for feeding younger animals. The rations were as follows:

	4a1	4a2
Ensilage	36	36
Hay	4½	4½
Corn meal	2½	2½
Middlings	2½	2½
Gluten	2½	0
Skimmilk	0	21
Nutritive ratio	1 : 7.2	1 : 7.2

METHODS USED.

Wollny's modification of Reichert's method was used in the determination of volatile fatty acids; Wiley's method, for the determination of the melting point; and Hubl's, for the Iodine Absorption Number. The hardness of the butters was measured at the same temperature by the depth of penetration of a weighted glass rod falling through a glass tube for a given distance, the penetration being measured in millimeters. The following details are recommended:

The rod should be three millimeters in diameter, twenty centimeters long, and should weigh ten grams. It should be pointed, but the distance along inclined plane, from point to surface of rod, should be no greater than the diameter of the rod. It is easily made by pulling out a piece of glass tubing of the required size and pushing a small piece of cotton down the inside to the point thus made, filling with mercury until the whole weighs ten grams, and finally closing the open end. The tube through which the rod is to fall should be one meter in length, perfectly straight, and of such diameter that the rod will fall perpendicularly through it without vibration and with scarcely any friction. At exactly the length of the rod from the lower end of this tube, a millimeter scale should be attached with the scale reading downward. The butter prepared in the usual way should stand in a cool room several

days, and then the depth of penetration should be taken at $15\frac{1}{2}$ degrees C., which is about the temperature at which dairy rooms are kept. The hardness of different butters is thus very simply compared, by bringing the tube in a perpendicular position over a plane surface of the butter at some distance from the edge of the mass; fixing the tube in this position, with the lower end lightly resting on the surface; then lower the ten-gram rod into the tube as far as possible with the finger and thumb and let it fall. The penetration can then be read off on the scale. The greater the penetration, the softer the butter. Except on very soft butters, the differences in triplicate determinations are seldom over one millimeter. The results in the tables are averages of several determinations.

INDICATIONS.

The work in this direction is not as yet extensive enough to justify the drawing of conclusions, but our experiments thus far indicate —

1. That gluten meal tends to produce a much softer quality of butter than corn meal or cotton-seed meal, and, other things being equal, tends to lessen the churnability of the butter fat.

2. That with the same cows the hardness of butter depends much more upon the character of the food than upon the nutritive ratio.

3. That ensilage produces a somewhat softer butter than does good hay, but it is also favorable to the flavor and texture of the butter product.

4. That skimmilk has a very favorable effect upon the churnability and quality of the butter fat, and in a single trial apparently reversed the general rule, that the volatile fatty acids decrease as the period of lactation advances.

5. That cotton-seed meal tends to produce an unusually hard quality of butter, and that cotton-seed meal and gluten meal might be used together with excellent results.

6. That contrary to general belief the melting point of butter fat is not a good index of the commercial hardness of

butter. That while, in general, a soft butter melts at a lower temperature than a hard butter, there is no definite relation between melting point and actual hardness.

7. That no relation can be traced between foods and volatile fatty acids, except in the case of skimmilk. That, usually, hardness and volatile acids vary inversely, hardness generally increasing and volatile acids decreasing, as the period of lactation advances.

8. That the iodine absorption of butter from gluten rations is greater than that of butters from cotton-seed or corn meal rations, and that so far as tried (see Table B) the iodine absorption number follows very closely the hardness of butters.

QUANTITY OF MILK.

G. H. WHITCHER.

The work above reported on by Messrs. Wood and Parsons, was carried on by them in connection with a series of experiments designed primarily to test the relative efficiency of a ration containing a large amount of albuminoids, as against one containing a large amount of starch.

The materials for bringing about this variation in the rations were corn meal and gluten meal, the latter being a waste product from the manufacture of glucose from corn; it is, in fact, corn meal from which a large part of the starch has been removed, it is, consequently, rich in albuminoids and oil.

The following table gives a comparative statement of the average digestible matter in the two food stuffs:

	Corn Meal. per cent.	Gluten. per cent.
Albuminoids	7.78	25.14
Non-albuminoids	71.60	61.90
Nutritive ratio	1:9.2	1:2.4

Now, as both are made from corn, it follows that whatever difference may be noticed, either in quantity or quality of the product resulting from feeding these grains, must be due to the

relative proportion of albuminoids and non-albuminoids, and not to any specific differences in the characteristics of the foods, as might and probably would be the case if linseed or cotton-seed were contrasted with corn meal.

In almost every case, with each of the eleven cows, a change from gluten to corn meal—that is, a change from a narrow to a wide nutritive ratio—resulted in a decided falling off in the product, while the reverse change resulted in an equally decided increase. In some cases this variation is obscured by the natural shrinkage which was all the time taking place. The table on page 493 shows the detailed results, each period being for fourteen days.

The following conclusions seem fully warranted, namely:

The proportion of albuminoids to non-albuminoids for the production of milk should not be much wider than 1:6.

A nutritive ratio of 1:5.2 produced eight per cent more milk than a ratio of 1:9.

A ratio of 1:5.6 produced nine per cent more milk than one of 1:8, and a ratio of 1:6 produced thirteen per cent more than a ratio of 1:7.

NOTICE.

The position of Station entomologist having been filled by the election of Professor C. M. Weed, we are now prepared to study the various problems connected with insect depredations, which, at the present time, are so disastrous to farm crops.

The Station will gladly undertake to identify specimens, if they are sent to us in some form of package which will insure their arrival in good state of preservation.

Any unusual outbreak of destructive insects will be promptly attended to if the Station is notified.

Address all communications to New Hampshire Experiment Station, Hanover, N. H.

Nutritive ratio.														
	1:6	1:7	1:6	1:7	1:5.2	1:9	1:5.2	1:9	1:5.2	1:9	1:5.6	1:8	1:5.6	1:8
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Snowflake, 2d	22.4	21.1												
Chinchilla	21.7	20.5	21.2	15.13										
Countess Gazelle					15.2	13.7	14.7	13.5	13.9					
Duchess					32.3	29.0	32.0	27.7						
Pilots Lily						16.6	18.8	16.5	15.6					
Maid of Arlis						17.4	20.7	20.1						
Noethboeo Belle										20.4	21.2	17.8		
Duchess of Hanover											16.4	14.6	14.7	13.8
Duchess, 2d		25.0	24.4											
Clio									23.7	23.5	25.4	23.2		
Frost										24.5	28.7	28.2	30.00	

BULLETIN No. 14.

ENSILAGE IN DAIRY FARMING.

The following bulletin is put out at this time, not because of the original investigation which it records, but more as an aid to those farmers who may be thinking of adopting the silo as a means of increasing the profits of dairy farming, by decreasing the labor item in the production and storing of the required food.

The present outlook for an abundant hay crop, while not positively discouraging, is not especially flattering, and I have no hesitation, after five years of practical experience with ensilage, in saying that no dairy farmer in the State can afford to be without a silo. Even on the so called "natural grass farms" a moderate use of ensilage will prove beneficial. Now, if this is true, and I am sure that time will fully demonstrate that it is, then the more rapidly farmers adopt the system the better, and I am led to issue this bulletin for the purpose of calling the attention of as many as possible to the matter, at a time when it is possible to take immediate steps towards guarding against a shortage in the hay crop.

There is now time to extend the acreage of corn for the silo; even as far north as Hanover we have produced good crops of fair quality when planted as late as June 10, and certainly throughout the greater part of the State, from the first to the tenth of June would not be too late for ordinary seasons.

ADVANTAGES OF ENSILAGE.

1. More actual food material can be produced from an acre of corn than from any other of our common farm crops. Land capable of producing two tons of hay will, as a rule, produce twenty tons of ensilage, having at least twenty-five per cent of dry substance, or actual food material.

40,000 pounds of ensilage equal 10,000 pounds dry matter.

4,000 pounds of hay equal 3,000 pounds dry matter.

It is safe to say, therefore, that three times as much dry substance may be produced from a given area of corn as from a like area of grass.

2. The cost of a hundred pounds of dry matter is slightly less in corn than in hay.

In our experience we have found the following figures to be substantially true :

100 pounds dry matter in ensilage cost .	42 cents.
100 pounds dry matter in hay cost .	44½ cents.

3. Green food is especially favorable to the production of milk. The succulent pasture grass in May and June is without an equal as a milk producing food. Mangels and other roots, when fed in combination with dry fodders, are known to have a very beneficial effect, and with ensilage the same has been observed.

In an experiment, carried on at this Station, where hay and ensilage were compared, the following averages were obtained :

Ensilage ration, containing 16.45 pounds digestible dry matter, produced 21 pounds milk.

Hay ration, containing 16.83 pounds digestible dry matter, produced 18.4 pounds milk.

There are those who claim that a pound of digestible matter in one substance is as good as a pound in any and all other substances, and that succulence adds nothing to the value of a food. This I do not regard as proven by practice. In Bulletin No. 11, of this Station, it was shown that one hundred pounds of digestible matter in a ration made up of skimmilk and corn meal was equal to 146.6 pounds of digestible matter in a ration chemically identical, but made up of corn meal and middlings. Practically, there can be no doubt that a pound of food material in the skimmilk ration was superior to a pound in the mixed grain ration, and I believe this was due largely to the favorable condition in which the digestive and assimilative organs were kept by the former ration. This

being true of skimmilk, I see no reason why pasture grass, roots, or ensilage, may not be likewise more valuable than dried fodders. In fact, I am convinced that foods containing a large per cent of water keep the animal system in such tone that it is able to make better use of the food digested. The efficiency of the steam boiler is very largely affected by the deposit of soot on its flues, not that the boiler or its flues are changed, or that the combustion of the coal is less perfect, but rather, that the heat produced by this combustion is not utilized in steam making. So, although the same amount of food may be digested in one ration as in another, yet the physiological condition of the animal may be such that this digested matter may in one case be utilized to far better advantage than in another. The problem, then, is not one of efficiency of food so much as of efficiency of the machine, i. e., the animal, and it is this animal efficiency which succulent or watery foods increase. The fact exists, that in every day practice two hundred and fifty pounds of average ensilage will fully take the place of one hundred pounds of hay, and in most cases the milk yield will increase on this rate of substitution :

The 250 pounds of ensilage will contain 41 pounds digestible matter, while 100 pounds of hay will contain 51 pounds digestible matter, or 100 pounds of digestible matter in ensilage is fully equal to 125 pounds in mixed hay, and as the proportion of albuminoids to non-albuminoids is not essentially different, this gain must be due to the condition of the two foods.

4. Convenience and cheapness of storing. A corn crop having been produced, it must in some way be preserved for winter feeding. "Topping the stalks," binding and stooking them, leaving the ears and butt stalks to dry out, was at one time the prevalent method, but it involved too much hand labor. Stooking the entire crop as soon as the ears are well glazed, and allowing them to dry for a month or more, husking the ears and mowing away the stalks, reduce the labor, but still there is the cost of husking, grinding the grain, etc., which at the present period of low prices for milk and dairy products

bears too heavily on the raw material item in the problem. To "reduce the cost of production" is the great problem in agricultural progress, and it must be done by reducing the amount of human labor which enters into farm products. A system of stooking corn in large stooks and leaving them in the field until wanted for feeding purposes has been, and is practiced, to some extent it saves labor, but wastes the crop, and is inconvenient in many ways. Curing the crop and storing are practically impossible on a large scale, since the amount of water to be dried out is very great, and the weather frequently unfavorable; in a small way it can be practiced, but the disadvantages more than offset the advantages. The silo, while not an ideal storage vault, does combine more good points and less bad ones than any method yet devised for preserving the corn crop, for the following reasons:

(a.) The farmer who has a silo is about as independent of the weather as any man can be. Heavy rain, it is true, will prevent the storage of ensilage, but, aside from rain, nothing interrupts this kind of harvesting; light rain and showers, while making the work disagreeable, do not put a stop to it necessarily, and when once in the silo all danger of imperfect curing, which so often injures the crop harvested in the old way, is past.

(b.) The season is practically lengthened from two to three weeks, since it is not desirable to have the corn for the silo much past the "boiling or roasting" stage, hence, a variety may be planted for this purpose, which stands no show for ripening, even one year in ten, and as the later varieties of corn are of larger growth and produce more actual food per acre, this gain is by no means unimportant in the more northern parts of New Hampshire. Again, if from unfavorable weather in May, planting is delayed, as already stated, until the first days of June, there is very little risk connected with the crop for the silo, where a crop for husking would be almost certain to be cut off by the fall frosts.

(d.) The early date at which the land is cleared makes it possible to either seed down to grass or winter grain. Corn

for the silo should be stored at about the same at which corn for husking should be stooked, and as the stooked corn must dry out for about a month before husking can begin, it follows, that practically the whole of this time is gained for working the land for the next crop.

(e.) The cost of harvesting, provided the crop is planted within reasonable distance of the silo, is reduced to a low point. It is true a large bulk of water has to be handled, and very much depends upon the conveniences for handling; an attempt was made to determine the lowest cost at which ensilage might be handled per acre and per ton with steam power for cutting and elevating into silo, and with an abundance of help, on a two acre field, the average distance of which was seventy rods from the silo, with the following results:

Cutting the corn in field, per acre . . .	\$2.00
Loading and drawing to barn . . .	3.75
Cutting and packing in silo . . .	2.40
Use of engine and cutter . . .	1.25
<hr/>	
Total cost	\$9.40
Yield per acre, 15 tons. Cost per ton . . .	.62 $\frac{3}{4}$

The crew consisted of three men cutting, three helping load, three teams, and four men to run the work at the silo. With this crew 24 $\frac{1}{2}$ tons were put in the pit in 4 $\frac{1}{2}$ hours.

In 1884, under more favorable circumstances as to distance and location, a seven acre field of corn was harvested with the greatest economy possible, and with the following results per acre:

Cutting and stooking	\$2.16
Drawing in fodder and cribbing corn . . .	2.56
Husking	5.00
Drawing corn to mill	1.50
Grinding	1.80
<hr/>	
Total	\$13.02

While I do not have the exact figures as to the per cent of dry matter in each crop, yet there was not above 6,000 pounds

in the husked crop, as against 7,500 pounds in the crop put in the silo. Allowing then a loss of twenty per cent for fermentation in silo, and no loss in the stored dry fodder, there would be an equal amount of dry substance to feed out.

One hundred pounds of dry matter at time of feeding out would cost, for harvesting alone, 25 cents in the husked crop, and $15\frac{2}{3}$ cents in the silo. Add to this the greater efficiency of the dry matter, pound for pound, and it is evident that from an economic standpoint the silo has the advantage.

It may be argued that these results are exceptionally low, but both are equally so, I think, and are fairly comparable since the labor is charged at the same price in each.

To those who have had experience with both methods of harvesting, it will seem unnecessary to argue that a crop of corn may be disposed of quicker, with less risk on account of weather, and with less actual expenditure for labor, in the silo than in any other way.

KIND OF CORN.

The kind of corn depends upon location. A corn well adapted to southern New Hampshire might be too late for the northern part of the State. The points of importance are: first, to get a variety of corn that will have a large per cent of ears fit to boil by September 5th; second, to get a variety that will produce the largest possible growth, and still meet the first condition.

For a general variety for this State I know of nothing better than the Sanford corn, a white flint corn, intermediate between field and sweet corn. On good soil and with heavy manuring we have produced twenty-five tons per acre, its average product would probably be about fifteen tons. It is a leafy corn, ears heavily, keeps well in the silo, and grows very rapidly.

AMOUNT OF SEED PER ACRE.

Contrary to the practice of many, I have always believed in heavy seeding: one bushel of Southern or Western dent

corn, fourteen to sixteen quarts of Sanford, and ten to twelve quarts of Northern field corn per acre, have given better results than a less quantity; on poor soil I would use less, but on well fertilized land the above quantities are not excessive when planted in rows three feet apart.

THE SILO.

The day of costly silos is past, and it is this fact alone which enables the rapid extension of this system of storage. A wooden silo keeps its contents with less loss than a stone or cement one, chiefly because of the penetration of air through mortar and cement.

A silo built independent of the barn, having its own frame, roof, etc., can be built for one dollar per ton of capacity, if above seventy-five tons capacity. Contracts can be let for the construction of a one hundred ton silo, the contractor to furnish everything, for \$100. If built in a corner of the barn the cost of material and labor will be about one half that sum, but on most farms, where there is lumber, and where much of the work can be done by the farm help, this cost can be reduced almost, if not quite, to an actual cash outlay of \$25.

A silo, 16 x 16 x 25 feet, will hold 100 tons. If built in a barn it will require:

40 pieces studding, 3 x 8, 25 feet long	. 2,000 feet.
4 pieces, basement sills, 8 x 8, 17 feet long	360 "
Boards for inside walls	3,500 "

The boards should not be over seven inches wide, planed on one side, and the inside course made to break joints with the outside course. Matching the boards is not only useless, but an injury. Common covering boards, free from loose knots, are good enough, and should not cost over \$12 per thousand. In many cases the barn frame and studding can be partly utilized, and the above quantity of lumber be considerably reduced. A cement bottom, though not necessary, is desirable.

Don't say "you can't afford to build a silo," it is just the other way, you can't afford to be without one.

Don't conclude to wait until next year; build one this year; you can easily find time to do it before haying, and then when the early fall frost hits your corn crop you will have a place where it can be put at once and saved.

Don't waste money on a stone or cement silo,—unless you want to for the fun of the thing, — a wooden one is better.

Don't subscribe to the doctrine that ensilage is too watery to be good for anything. Remember that pasture grass in June has more water in it than ensilage has.

Don't plant Western corn, or Southern corn, but get some variety that will perfect the kernels and produce a good number of ears.

Don't forget that you can soon double the supply of fodder by adopting this system; more fodder means more milk, and more milk, more cash.

THINGS TO BE DONE.

Plant two or three acres more of corn as soon as possible.

Select a place in your barn that is convenient, and see how much lumber, and of what dimensions, will be necessary.

Get the lumber, and at odd times put in a silo, and before the fall frosts come, or immediately after, put your corn into it; have it cut into $1\frac{1}{2}$ -inch lengths if you can, but if this is too much trouble pack it in whole.

To sum up: DON'T throw this bulletin aside without thinking the matter over, but consider the subject well, and build a fifty ton silo and try it, the results will convince you.

G. H. WHITCHER,

Director.

MEETINGS OF THE BOARD.

MEETINGS OF THE BOARD.

ANNUAL FIELD MEETING AT HAMPTON.

The sixth annual field meeting of the State Board of Agriculture was held at Boar's Head, Hampton Beach, August 27, 1891. Owing to unfavorable weather the attendance was not as large as in some former years, but the interest in the meeting and subjects under discussion was never excelled.

At 11 o'clock the meeting was called to order by President Humphrey as follows:

ADDRESS BY PRESIDENT HUMPHREY.

Ladies and Gentlemen:

This is our sixth annual meeting at this place. Heretofore we have always had very pleasant weather, but to-day, unfortunately, it is rainy. The rain, however, should not detract from the spirit of the meeting. We may not have so many here as though it had been a fair day, but the spirit of the meeting should be right without regard to the day. We know that our Methodist friends have good camp meetings and enjoy them supremely because they all pull together and have one idea. Now the Board of Agriculture comes here with the idea of presenting something to you all, ideas that have been found practical and useful in the cause in which we are engaged, and we want you all to take hold and help us.

Last year at our meeting here, the Board of Agriculture in session chose a committee for the purpose of bringing before the Legislature the importance of accepting the Thompson will, as the Board of Agriculture was very desirous that the

State should get the benefit of it. That committee went to work, and the result is that we are to have an agricultural college down here at Durham. I think I know enough of the Legislature and of the influences there that work against the interest of the farmer, to know that without the force that we had there in our committee and in our State Grange—all working together—we should not have had the prospect of this college in the near future, as we do to-day. I see a distinguished gentleman here, of the State Grange, who was in the Senate, and he did a host of work to obtain that appropriation of \$150,000 to put the buildings down at Durham where they are now to go. I will say that if the State Grange and Board of Agriculture never did anything more, they have done enough to immortalize their names, in my opinion, through all generations to come.

But I did not come here to make any argument or any talk. We have speakers here for that purpose. I now have the pleasure of introducing to you the Honorable Joseph B. Walker, of Concord. Possibly you have heard him before. He has always been ready to assist the Board whenever occasion required, and to go into any part of the State, sacrificing his own interest for the cause of agriculture.

THE NATURAL RESOURCES OF NEW HAMPSHIRE.

BY HON. J. B. WALKER.

Some years ago, in the days of our genial Adams, this Board's first secretary, I was engaged by him to deliver at one of its institutes an address upon the subject of Forestry. When he reported this fact to his chief, the present chairman, the latter remarked with some surprise, "Forestry, forestry, nobody cares anything about forestry." To say that this remark put my sweet temper into a state of violent ebullition, is to state the fact in the mildest possible terms. At length, however, when the harmless boiling had subsided, I became convinced that Uncle Moses was right; that, for once in my entire life, I had got ahead of my time, and that while

I was in one respect like John the Baptist, a voice crying in the wilderness, I was in another, entirely unlike the great forerunner, for he had followers and I hadn't.

But while Mr. Humphrey's remark was true twenty years ago, it is not so to-day; a fact which affords gratifying and important evidence of the growth of our agricultural intelligence.

If New Hampshire were to-day, for the first time, put into our possession, as was Eden into the control of Adam, "to dress and keep it," our first inquiry, doubtless, would be, "what shall we do with it?" To answer as best I may this great fundamental question, so important to all our interests, I am in your presence to-day.

A survey of our State shows that we have a territory nearly two hundred miles long, with a greatest breadth of about one hundred; embracing an area of about six million (6,010,880) acres of diversified surface, lying at elevations which vary all the way from the sea level to an altitude of nearly a mile and a quarter above it, consisting of multitudinous water areas, amounting, according to one official authority, to a million acres, but which I venture to place at one half that number; of much good arable land, and of far more of a rougher kind, which has never yet tolerated culture, and never will.

This is our inheritance, not a great, but a very respectable one. Are we equal to its full development? What shall we do with it? Yes, what shall we do with it? This question is not a new one, first asked in our day. It was propounded by John Mason, the first proprietor of New Hampshire, more than two hundred and fifty years ago. It has been asked over and over again, by the nine or ten succeeding generations which have occupied it, and been variously answered by each in its time. It has come down to us and we cannot evade it. To what uses can we most profitably apply these six millions of acres of which we are now the guardians. This is the great question of to-day.

Some of the earliest settlers of the State said, "establish

here the fur trade," and it was done; but the catching of beavers, and muskrats, and skunks, and woodchucks, proved a meagre business and was discontinued, for the want, possibly, of a Legislature to attract by suitable bounties game from outside our lines.

Others of the earliest inhabitants, of ardent thirst, perhaps, suggested the making of vineyards, and vines were planted on the sunny banks of the Newitchewannock. But this business proved unprofitable. Modern experience indicates that had they established breweries instead, their ventures might have proved more remunerative. But they probably would have been premature, for there were not then in all New England parched throats enough to swallow a thousand barrels a day.

Mining was proposed, and search was made for precious and useful ores; but in vain. These have never yet been found in plentifulness sufficient to return a new dollar for an old one. The history of mining in this State from 1623 to this year of our Lord, 1891, has been one of uniform failure, and at times of sad personal disaster to those who have pursued it.

Others said, look at these broad forests which everywhere cover the ground; and saw mills were erected upon the Piscataqua and its tributaries. The manufacture of building timber and plank, pipe staves and masts, was commenced and prosecuted with vigor. Ships also were built and in time the lumber interest became the leading business in many localities. Resulting from this came a considerable export trade of forest products to West Indies, Southern Europe, and to our mother country.

But when in time, the importation of foreign corn for the support of the people proved too costly, and its transportation for grinding, to and from the wind-mill at Boston, too onerous, local agriculture was suggested. From that day, down almost to the present, New Hampshire has been regarded as an agricultural State.

Such were the leading answers given by our progenitors

to this important question. "What shall we do with our domain?" I again put it to you to-day. Let us summon into activity our broadest wisdom and answer it as best we can.

If our friend, Colonel Weare, is present to-day, as he usually is at these gatherings in his neighborhood, he will be likely to say, "agriculture has been our chief support for two centuries. Improve its methods, enlarge its operations and let it remain such." But nature has restricted our farming to less than one half of our territory, we have never plowed more than one sixth of it, we have never pastured more than one quarter of it and we never can, to any profit. Our agricultural operations cannot be much extended beyond their present limit of some two millions and a quarter of acres. To attempt it would be to contend with nature, in an effort sure to prove as vain as it would be foolish. What, therefore, shall we do with our remaining three millions of acres?

A partial answer to that question is sure to be, utilize our ubiquitous water power and establish manufacturing industries in all sections of the State, from Indian Stream to the mouth of the Piscataqua. And in this proposition there is truly much wisdom. While our manufacturing interests are already of great importance, we have but very partially utilized the natural powers offered by the streams to be found in every town in the State.

Some twenty years ago, following the example of her sister State of Maine, New Hampshire made a slight effort to ascertain the locations and amounts of her water powers. A commission was appointed by the governor and council, who made a cursory examination of the subject, and a preliminary report, in 1870, which embodied many important facts.

We learn from this that nearly fifteen hundred streams of varying volumes have been laid down upon our state and county maps, and that, in answer to a circular sent to the towns by the commissioners, asking for the number of water powers in each, returns were received from ninety-one of the two hundred and thirty-eight, or thereabout. These were as follows:

21	towns in	Rockingham county	returned .	.	48	powers.
6	"	Strafford	"	"	30	"
5	"	Belknap	"	"	36	"
4	"	Carroll	"	"	20	"
9	"	Merrimack	"	"	94	"
12	"	Hillsborough	"	"	138	"
12	"	Grafton	"	"	159	"
4	"	Sullivan	"	"	36	"
12	"	Cheshire	"	"	132	"
6	"	Coös	"	"	58	"
<hr/>					<hr/>	
91					751	

The officers of many of these towns accompanied their returns with the remark that they were imperfect, and that they had made but partial lists of the water powers in their several towns. Yet, these averaged eight and a quarter powers to a town. Upon this basis, New Hampshire has nearly two thousand water powers (1,963), a number doubtless much below the actual one.

Those on many of our streams have never been utilized at all. Indeed, thus far, New Hampshire has availed herself in but a small degree of this vast natural force which has been so generously placed at her disposal. The full utilization of it would treble our population, more than treble our wealth, and increase proportionately our industrial and political importance. And yet, we had invested in manufactories in 1880, over fifty millions of dollars (\$51,112,263) which yielded an annual product of nearly seventy-five millions (\$73,978,028); four or five times that of our farming. Manifestly, we are destined hereafter to become more of a manufacturing than of an agricultural people, if, indeed, we are not already such.

But when we shall have utilized all the water power in the State, and surrounded their sides with prosperous villages, there will still remain some three millions of acres — a strong half of our area — waiting to be improved. What shall we do with these, or rather what can be done with them to render them the most productive? The Almighty has made them for

something, but for what? This is one half of the whole great question which asks an answer just here and now, with the deep resounding sea on one side of us, the plains and mountains on the other, and the blue vault of heaven bending over us.

In my own humble opinion there is but one sensible answer to this inquiry. The rugged sides of many of our mountains and hills, scattered everywhere over the State, spurn the plough and will yield neither grass, roots, nor grain. Left to themselves, however, they will grow wood and timber perpetually, the crop which nature assigned to them when the State emerged from the universal flood which had covered it for a period of whose duration we have no knowledge. That is the crop and the only one which they have borne since man has known them. It is the only one which they are willing to bear. Is it not as well to allow them to do as they will and govern them in the line of their aptitudes?

Early one morning, some years ago, as the late Mr. Thomas B. Leighton sat upon the piazza of his Appledore House, just across this bay at the Shoals, and had taken from his mouth the long horn, with which by gentle tootings, oft repeated, he was wont to arouse his guests, your speaker said to him, "what do you do when they won't wake up?" "I accept the inevitable and let them do as they will." We may wisely, I think, adopt this policy in our treatment of this large half of our domain. For we cannot raise grapes on thorn trees, or figs on thistles, or maize on the shaggy sides of Mount Washington, which will produce trees in abundance and forever.

Now, in case we shall follow the leadings of nature, what may we reasonably expect as the annual return of these rough acres? Each of these three millions ought to produce five thousand feet of timber every forty-five years, amounting to fifteen thousand millions of square feet, worth in the woods, at five dollars per thousand, seventy-five millions of dollars, or one and two thirds millions (\$1,666,666) per year, aside from the wood of which no mention has been made. We regard this estimate a reasonable one, and its realization easily possible.

But look a little farther. When this lumber has reached its ultimate condition by manufacture, its value will have been increased all the way from two or three to a dozen times its original amount, from four or five to ten or fifteen millions of dollars, according to the uses to which it may have been put.

This increase we are now giving very largely to manufacturers outside our lines, by exporting most of our lumber in the log or in partially manufactured forms, and thereby reserving to ourselves but a small fraction of its final value. In other words, we are selling raw material, to which foreigners apply their labor and make fortunes, which we may and ought to secure to ourselves. Communities grow rich but slowly, if at all, by the exportation of their raw products. Our Southern States are learning this lesson very fast, and it will enure to our profit, if we also hasten to do likewise.

Thus far, our woods have yielded us but a small portion of the wealth which they would have done had their capacities been developed as they might have been. Properly managed, where they are now affording occupation to dozens of people and supporting inconsiderable hamlets, they would give employment to hundreds, often to thousands, and convert these hamlets into populous villages and thriving towns.

No great interest in New Hampshire has been so recklessly administered as has that of very many of our forests. The private interests of proprietors only, or rather what they deemed to be such, have been consulted. Formerly, and to some extent now, in the northern part of the State, no trees below certain minimum sizes were or are cut. Under this system, no immature timber is removed, the ground is shaded and its moisture preserved. As a consequence, the young growth is for the most part saved. Fires are comparatively few and their ravages not frequently extensive.

But when, at dry seasons, fires have started upon land from which the entire growth has been removed, their arrest has been well nigh impossible, and every thing upon them, living and dead, has been destroyed. In some cases, the soil itself even has been consumed, and only one sad scene of

awful desolation has been left to tell the story of mismanagement and neglect.

Last season, the speaker followed up a valley of the White Mountains, some seven or eight miles, which had been thus made frightful. The fire-bleached ledges which flanked its entrance instantly suggested the horrible inscription which Dante, in his "Inferno," has placed above the entrance arch of hell, —

.. All hope abandon, ye who enter here."

In this devoted valley, some five years ago, from crest line to crest line of the mountain ranges which wall it in, raged for days devouring flames which consumed every living object upon its surface, save here and there a few trees which the wet ground protected, and the limpid stream which defied their power, — the whole scene there unfolded to view affording a marked example of the effects of drought, denudation, and careless firing combined.

As one wanders through that valley, gazing up and down its desolated sides, and pauses here and there to look upon the pure waters of the stream which divides it, he may realize as he has never done before, the sharp contrast of the blackened horrors of the eternal pit with the "river of water of life, clear as crystal, proceeding out of the throne of God and the Lamb."

But forest fires and denudation do not affect injuriously the forest alone. Their disastrous effects are felt by all our other great industrial interests as well, for these are all more or less inter-dependent upon one another. This remark applies particularly to the agricultural and manufacturing industries of the State. Whatever tends to diminish the water supply or to render it variable and uncertain, is detrimental to these, to a marked degree.

It is a mistake to regard the lakes and ponds of New Hampshire as her great reservoirs. These are her forests. The former are simply catch-basins which hold the stores which the latter have received from the clouds and yield as wanted

under the gentle but constant pressure of gravity. Fires consume the covering of leaves and mosses which give them their retaining power, and convert their surfaces to blank areas of rock and sand, down which the rains flow as readily as showers down a roof.

Denudation causes them to freeze early in autumn. As a consequence, the entire precipitation of winter rests upon an impervious bed, exposed to evaporation and removal by sun and wind, whereby much of it is lost. Whatever of it remains until spring, melts before the frost leaves the ground, and is converted into torrents which plow the plains with destructive violence, cover fertile fields with barren débris and in headlong haste cause devastation wherever they go.

There is another great interest, not yet mentioned and of a comparatively recent date, which is particularly sensitive to a maladministration of our forests. I refer to the summer visiting interest. This is omnipresent throughout the State. We all of us know more or less about it, but, in the absence of exact statistics, have a vague and inexact idea of its magnitude; yet, our personal observations are sufficient to indicate its great importance and that its future development bids fair to materially increase the value of our real estate, to awaken from their lethargy scores of our now too quiet villages, to improve our social condition, to render more attractive our homes, and afford us local markets where ultimate prices may be realized for the surplus products of our farms and gardens.

Mr. John Lindsey, of Lancaster, remarked some years ago that he remembered when the combined annual receipts of all the White Mountain houses were but twelve thousand dollars (\$12,000).

Mr. Edward Hungarford, in the present August number of the "Century," tells us that the White Mountain hotels and boarding-houses now have accommodations for eight thousand persons, and that Bethlehem alone can take care of three thousand. According to his estimate, no less than three hundred and twenty thousand (320,040) persons visit this part of the State every year. But reduce his estimate one third, cut .

the number down to two hundred thousand (200,000), and assign to each an expenditure of five dollars while there (and who can run the gauntlet between "Boots" and the bell boy on one side, and the gentlemanly clerk and the invisible proprietor on the other, for a less sum?), and this number will be found to have left behind no less a sum than one million dollars, besides the amounts paid to railroads and stages for transportation.

The industrious secretary of this Board of Agriculture tells us that, in response to his circulars sent out in 1889, to the hotel and boarding-house keepers in New Hampshire, asking the several amounts of their gross receipts for that year, he received returns aggregating five millions of dollars, five times as much as the value of one of the ordinary annual corn crops of the State.

These figures abundantly show that New Hampshire possesses strong attractions of some kind, which bring within its borders every summer the throngs of men, women, and children that appear among us. What are the attractions? They are not those of Mecca or Lourdes to which multitudes go as pilgrims impelled by religious motives. They are not those of New York or Leadville, nor those of the prairies and the plains, whither men and women go to make money, for visitors do not come here to worship, but to have a good time. They do not come to make money, but rather, to spend it. They are an amiable, well-behaving crowd, with shekels in their pockets which they are willing to part with for a fair consideration. Their numbers increase rather than diminish, and they penetrate every town and almost every school district in the State. What attracts them?

Among the attractions influencing this great throng are :

1. *Pure Air.* When, in July and August, a few weeks of rest and recreation are offered to men and women who spend eleven months of the year in close streets and furnace-heated apartments, they naturally seek God's open country and the fresh air of the hills and mountains, upon whose sides many of them first saw the light. However perfect the ventilation

which art, guided by science, has introduced to the crowded stores and offices and work shops of our large towns, their atmosphere can never equal that of the highlands of the open country, or of the surf beaten shore where the pulse-beat of the wide ocean invigorates the weakened pulse-beat of man. In these sultry months, New Hampshire offers to all who pine for freshness and space, invigorating breezes brought upon our coast across the arctic current, or strengthening ozone wafted over all our inland country from the great storehouses of the frost king in the far north-west.

2. *Pure Water.* Next to pure air, pure water is essential to the physical welfare of man. When large numbers of people settle upon limited areas, the obtaining of this is a matter of no small difficulty. They are obliged, consequently, as the best to be had, to use waters of inferior quality. But this necessity does not destroy their relish for those, clear as crystal, which our mountains distill from the clouds and transmit everywhere through rock-bedded channels for the free use of all who care for them. It rather increases it.

He who has been obliged to drink the indifferent waters of the great cities will appreciate the worth of our mountain streams. He who has journeyed from Jersey to Florida, over the great sand belt which lines the Atlantic coast, and noticed the turbid character of the streams which cut through it to the sea, will understand the surpassing excellence of the white waters of granitic regions. He who has attempted in vain to allay his thirst with the flat, tasteless waters of the prairies, knows how to value those of our New Hampshire springs. Next to the living waters of eternal life, springing in the regenerated heart of man, are the crystal streams of our hills and mountains.

3. *The Accessibility of our Position is a Third Attraction.* The great Creator of all things has seen fit to place the White Mountains and their ten thousand surrounding hills within the bounds of New Hampshire. That of Mount Washington is the highest mountain summit on the east side of this continent, north of North Carolina. In July and August, ten

millions of people may reach it between the sunrise and the sunset of a single day. Luxurious railway trains from all directions converge to it, as did the great highways of the Cæsars to imperial Rome.

4. *Love of the Fatherland.* Thousands of choice men and women during the last seventy-five years have gone from the home of their nativity to seek fortunes abroad. Large numbers of them of the first or second generation, attracted to their fatherland by an interest which can be better felt than expressed, come back from time to time to visit kindred and scenes hallowed by the associations of other days. Not a few, with the means which enterprise has gained for them, are building summer homes here and there, all over the State. The love of country life is a characteristic of our race, which, if circumstances allow, is sure to manifest itself in the acquisition and improvement of landed estates. There is no property so precious to a man who has English blood in his veins as a piece of God's fair earth, extending from the point where gravity centers to the realms of illimitable space.

5. *Our Scenery.* But the strongest attraction of any, probably, is that afforded by our scenery. I spent a winter some years ago upon the flat lands about the Gulf of Mexico, and became familiar with the floating bogs of its northern shore, with their gradual elevation to marshes, and still higher sand plains farther inland. They proved exceedingly monotonous and uninteresting. And when, at length, I started homeward upon the great Mississippi and watched, league after league, from the steamer's deck the rich bottoms through which it flows, that depression of spirit which monotony and ennui engender became painful. But when, at length, the little bluff upon which Natches stands came into view, exhilaration succeeded, for it seemed a gate post of Paradise. Indeed, there is very little to interest in the vast sedimentary plains which stretch, in some sections of our country, in all directions to the horizon, reminding one only of former submergence and of pre-historic monsters which the geologist only cares for.

But when the traveler rises to higher regions, where omnipotent Power has bent the pliable strata of the earth's crest into mountain and valleys, and clothed their sides with forests of perpetual green, an interest is awakened which never flags.

What the Alps and their outlying foot hills are to Switzerland, the White Mountains and their notches are to New Hampshire. Its mountains and valleys have made that little country of central Europe the sanitarium of the continent. If we improve, as we may, our grand opportunities, similar attractions will make our gallant State an important health resort forever.

The sum of what I have thus imperfectly said is this :

We have in our little State of New Hampshire a respectable heritage, affording some half a dozen leading resources, which are valuable, just in proportion to the wisdom and energy with which they are developed.

1. We have an agriculture whose products may be doubled or trebled, if the farmer will but rise to the level of his opportunities.

2. We have water power, of which only a tithe or less has been utilized, sufficient to give us high rank as a manufacturing State, if it be utilized as it may be.

3. We have forests covering half our area, which will yield us annually and perpetually for the simple taking, crops of wood and timber, whose manufacture may give profitable employment to large numbers and increase greatly the population of the State.

4. We have scenery unsurpassed in many respects by that of any other State, which in consequence of its attractive power has just as much a cash value as the soil of our fields or the granite in our quarries. If any one doubt this let him try to buy the summit of Mt. Washington or the old man of the mountain in Franconia Notch.

These and other resources to which I cannot now allude, thus far but partially developed, have hitherto given us a frugal living. Utilized as they may be, they will make us rich.

In a word, I can best illustrate my idea of our present situa-

tion as owners of this heritage by quoting the remark of a canny old Scotchman who once called upon me to see my farm. As we rode over it he complimented the different sections and I became so inflated with sweet satisfaction as to endanger the button-holes of my jacket. But his parting words produced a sudden collapse and removed the strain. These I have never forgotten. Said he: "You have a very good farm, Mr. Walker, but you don't half carry it on."

THE PRESIDENT: I now have the pleasure of introducing to you the Honorable Charles McDaniel who is master of the State Grange and also member of this Board.

REMARKS BY CHARLES MCDANIEL,

MASTER N. H. STATE GRANGE.

Mr. Chairman, Ladies and Gentlemen:

It is with pleasure that I meet you here again to-day and offer you congratulations on the membership of the State Grange of New Hampshire, which to-day numbers fully ten thousand. During the past year perhaps our additions have not been quite so numerous as in some preceding years, yet we have had valuable additions such as we are truly proud of. Such men as the honored president of this Board, another who is the representative of the leading agricultural paper in the State, Senator Gallinger, and many others who have been added to our list within the past year. On account of such men as these we may well feel that we have cause for congratulation.

As an organization of farmers, we feel that it is within our power to do something in the cause that has here been spoken of to-day, in regard to the forests of New Hampshire. We may not, perhaps, have so great an interest in that as the commission that has been appointed by the governor and council, whose honored chairman has spoken to you, yet we are in sympathy with the movement and with the commission, and I hope that the rank and file of this organization may aid in carrying forward the work so successfully begun by that commission.

Mr. Walker has spoken to you about the natural resources of New Hampshire, its pure air and waters, and of the other attractions of New Hampshire. Perhaps it would be well, for a moment to compare those with some of the attractions in other sections of the country, and then to speak of some of the means, which may be put forth to carry into effect further development of these forests of ours. While he was speaking of the grand panorama spread out in New Hampshire and New England, of this scenery and this landscape that surround us, other places of special interest came to my mind, places that attract the traveler and the pleasure seeker. The Garden of the Gods located in the vicinity of Manitou spring, it is composed of but a small tract of land, only a few acres, and yet in that compass you will find stones of all sizes from the balancing rock of one hundred thousand tons to the minute pebble. It is all in a little compass of its own. There is a great contrast between that and the broad expanse of scenery that surrounds us on every hand, where there is pure water and pure air, as has been said, in abundance, where we have these noble forests and the hills and streams spread out before us in one grand panorama. It is no wonder that people come here to seek health and enjoyment during the summer season.

Now this organization of ours can do something towards developing this work of forestry. We have an organization that is affecting our Legislature, and through the means of this Legislature we hope to develop all the interests that have been spoken of to-day in a more effectual manner than can be done in any other way. In organization there is strength. It is by organization that our agricultural college, which we anticipate will soon be a fact, was brought before the people. On that land that is to belong to the college, we have, I believe, one of the best forests in the State of New Hampshire. It is not of large area, but we have in it a number of pines growing to nearly four thousand feet in a single pine. So the question comes before us now, and before you all: What shall we do with it? Shall we preserve it in its beauty, or shall we cut it down and cultivate the land upon which it is. That is a

question which I would like everyone of you to consider and form an opinion in your mind; then let us have the benefit of your ideas. There is land there worth not less than sixteen thousand dollars in its present condition, and is it not for us, as farmers of the State of New Hampshire, to consider these important questions, not only as affecting the summer interests, but also the interest of the agricultural part of the State.

The college farm is one of those that has been spoken of very often, or perhaps might be referred to as one of those farms that have been advertised, although I believe this one has not been advertised. It is one of those farms that has been practically neglected for more than twenty-five years. The hay has been taken off from it and sold in the market. Yet I believe we shall establish a college there which will be one that we and all the people of the State may well be proud of. We are deeply interested in this matter and we believe that we shall have one of the best institutions, not only in this State, but in the country. And it is for us to say; it is for this organization we represent to-day, this farmer's organization, to think of, discuss, and devise the best ways and means in regard to this farm of ours and the forest upon it. I say, "this farm of ours" because, although it is not yet ours, it soon will be. Next Tuesday when the governor and council meet it will be a part of the property of the State.

Now let us discuss this question of forestry which has been brought before us by the State Board of Agriculture to-day. Let us discuss it in the one hundred and thirty Subordinate Granges that we have. Let the Subordinate Granges and the State Grange go hand in hand with the Board of Agriculture in this matter, because we have come to be so nearly identified with each other that we are practically one, especially since we have the president of the board with us. We have a common interest in all of these things and I think we can accomplish something in this direction of forestry, if we all take hold.

It has been alluded to by the gentleman who gave us this most excellent address that New Hampshire was a specially

healthful resort. This reminded me of an incident that occurred when I was on one of our trains. On the same train was a gentleman from Georgia who had come North for his health. He had with him as nurse, a colored gentleman from Atlanta, Georgia, who was a gentleman of very good demeanor, very well educated, and seemingly as perfect a gentleman as you would find anywhere. We were speaking about the scenery, and among other things I asked him in regard to his impression of the country. He went on to give me a description of his feelings, and he said that he was very deeply interested in its pure air, its pure water, its beautiful scenery, and more than all, he said, I am interested in the people that I find here in the North. They are very much different from the people in Georgia. I see here noble men and women, well formed and developed physically, and they are so full of ambition, life, and energy. Now it occurred to me that it was something worth remembering that a colored gentleman, coming from his native South up into the North, should notice this, and it seemed to me that here was a lesson that we should not only cultivate our forests and our agricultural resources but that we should try to improve the crop of men and women that we are raising; for from the grand results that have already been accomplished, we see that we are in a favorable condition for the raising of noble men and women.

In conclusion, I wish to call your attention to the fact that the State Grange has had an additional feature added to it in the past year. You recollect very well that I have spoken to you of the interest that has followed our plan of insurance and our various other enterprises. Now there comes another, and one in which we should all be interested. We are to present it to the public next month. It is the baby show which is to be held at our next fair at Tilton. So we are not only endeavoring to protect the forests of New Hampshire, but we are intending to show some of the best and most attractive babies that New Hampshire can produce.

THE PRESIDENT: We have with us a gentleman representing another agricultural organization, Brother Connor of Hopkinton, president of the State Dairymen's Association. I wish to say in connection with what Mr. McDaniel has said, that he is one of the trustees of the Agricultural college. I now introduce to you Mr. J. M. Connor.

HOW TO MAKE FARMING A SUCCESS.

BY J. M. CONNOR.

This is my theme. It is the Alpha and Omega of all our discussions. To attain this grand object the Board of Agriculture was instituted. That noble order, the Patrons of Husbandry, came into existence to aid in the achievement of this success. Colleges of agriculture and experiment stations have been founded to aid the work of successful agriculture.

A new avenue is now being opened in the form of summer boarding, another road to success, if rightly conducted. I shall not confine myself strictly to the discussion of this new and rapidly growing industry, which has been so ably discussed by those who have preceded me, but shall consider in a more general way how to make farming a success. I will say, however, that the subject of forestry is not confined alone to the grand old hills and mountains of our State; its application is as broad as the boarding industry itself. There is hardly a town in the State but that is now quite extensively availing itself of this source of income. We are planting trees and vines about our homes, carefully preserving and encouraging their growth by our roadsides; each farmer striving to make his wood lot a grove of beauty and of profit, cutting down the unsightly apple trees, and clearing out the hedges around the fields, to do whatever he can to make his home surroundings attractive, will help on this industry. It will serve a double purpose; it will attract the denizens of the city to his home and community. But above all, such a place will attract the sons and daughters of our homes and lead to a higher estimate of rural life.

I chose this subject because the larger proportion of the farming community hang their heads in doubt over this problem, because the young and rising generation look for success in life in some other direction than tilling the soil.

I come to you as a practical farmer, starting in life from the lower round in the ladder of fortune and by persistent effort climbing high enough to satisfy a reasonable ambition, and to feel a degree of confidence in the words I may speak.

The world is full of men whose utterances and imaginations exceed their judgment, whose theories while looking plausible upon the surface, serve little or no purpose when brought to the test of practical earnest life work. They may serve some purpose to those who ride over the smooth and shallow water of life, but to those who expect storms as well as sunshine, theories will amount to but very little.

We are living in an age the most remarkable the world has ever known. The past fifty years in the life of this country, in the development of its scientific and mechanical work, has no parallel in man's existence. The contemplation of these wonderful achievements furnishes a tale, stranger than all the fiction which the imagination of man can produce. Within the memory of men now living, all these wonders have been performed. Go to the great centres of commerce, behold this great network of railroads, consider all these stupendous mills and machinery, and do you wonder that the imagination of the rising generation is aroused? Do you wonder that these quiet, unpretending, non-progressing homes, that have stood unmoved these fifty years, are disturbed, disquieted, finally abandoned? From the brown earth comes all the material that keeps in motion all these vast mills, forges, founderies, and workshops, that builds up the colossal fortunes of the railroad power, that fills the immense storehouses, and whitens every sea with its commerce.

Shall an industry that furnishes all the materials to feed and clothe the world, that is the basis of this wonderful wealth and prosperity, be disgraced and dishonored? Is there no way by which the toiler, who from nature's vast storehouse, fur-

nishes the rough material which is the beginning of every other industry, can be fully compensated for his labors, and can share the honors that mark the progress of this wonderful country?

I shall treat this subject under two heads.

First, how can the individual farmer become successful? and secondly, how can success crown this as an industry?

First, then, as individuals, the thought I would impress upon everyone, whether he is engaged in special or mixed farming, is, that he be fully impressed with the magnitude of this calling. I assert, without the fear of successful contradiction, that no man has the ability to conduct mixed husbandry, with a tolerable degree of success; that no ordinary farmer, with himself and the help usually kept on our farms, has either the physical or the mental ability to succeed by the methods now in practice. You are all familiar with the methods by which large manufacturing establishments are conducted. Every man has his particular line of work, and as he becomes familiar with it the best results are obtained. Let me illustrate. A wealthy syndicate buy up a township of farmers, for the purpose of entering into farming on an extensive scale. They employ a large force of men, erect buildings, employ experts in the different lines of work, and put each man on the line of work for which he is best adapted. In fine, it would be conducted upon just the principle that all manufacturing establishments are now conducted, and upon no other plan could such a concern succeed. I do not propose to take an extreme view of this matter, but we must awake to the fact that the lines of competition are being drawn tighter and tighter, and the farmer who desires to achieve financial success must conduct his business upon a basis approximating somewhat the principles upon which other industries are conducted.

The farmer is, to a large extent, a manufacturer, but he must not attempt the manufacturing of too many kinds of goods at the same time. He has to deal with animal and vegetable life, with all the mysteries that enter into the composition of the soil, the action of light and heat, and the ever varying seasons, in fact, he is in nature's marvelous laboratory, sur-

rounded by forces and mysteries, in a measure beyond the comprehension of ordinary mortals. Imagine to yourself a farmer with ten thousand dollars invested in a well regulated farm, with flocks and herds, fruits, vegetables, and grasses. He is standing in the midst of all these, ministering to their various needs and conditions; out of all this wonderful mechanism he is to produce the delicious food to support him in existence. Turn now to the ten thousand dollar manufacturer, perhaps engaged in making doors and sash, carriages, or some line of goods. Which of these two men needs the most brain power to be successful?

If, then, it is all one man is capable of, to follow one profession, or one line of work in the mechanical world, what think you of the farmer who attempts to master all lines of work involved in mixed farming?

When we contemplate the tendency of the times, we can arrive at no other conclusion than that the future farmer to be successful, all other things being equal, must follow out some line of work to its greatest perfection. We will enumerate some of these lines of work. Market-gardening, conducted by those who make it a specialty, around our cities and large towns has become a profitable industry. The ordinary farmer cannot compete with him, and should not raise more than enough for home consumption.

The raising of milk is a branch of farming that can only be successful as one adapts his crops to this line, selects animals that are best adapted to the production of milk, and feeds in quantity and quality so as to obtain the best results at the least cost. Take dairying, an industry now commanding such universal attention, upon which there is such a diversity of opinions and of results. No branch of farming better illustrates the blindness and folly of attempting to conduct business without reference to a knowledge and adaptation to its needs.

There are to-day in New Hampshire, in round numbers, not less than 100,000 cows. Three fourths of these cows produce less than 100 pounds of butter each, or its equivalent in milk, annually, as a result of poor breeding, poor feeding, and bad treatment.

Those who have given dairying any thought, or have had any experience in this industry, will not deny that it is easily attainable to breed and so manage a dairy as to produce from 200 to 250 pounds of butter annually. The difference between a cow that produces less than 100 pounds of butter, and one that produces 225 pounds, is the difference between ruin and success.

But we have considered only the question of pounds, regardless of quality. The difference in value between 100 pounds of inferior butter, and 225 pounds of a superior article, carries the comparison a great way farther. When we consider results so alarmingly at variance, shall we for a moment hesitate as to which of these two methods leads to success? Such fearful odds exist in no other industry, and it is a shame and a disgrace to the farmer, that in this age, when so much knowledge can be obtained concerning a single branch of his labors, that he will allow such a discrepancy to exist.

Let me give you another illustration, that of fruit raising. Hundreds of thousands of dollars have been spent by New Hampshire farmers in purchasing fruit trees and vines, and it is safe to say that nine tenths of this money has been a dead loss. And why? Because the farmer had no time to give for their proper care and cultivation, and knew but little of the true method of conducting fruit growing.

It is safe to assume that three fourths of the fruit grown in this State takes care of itself, without any care or effort on the part of the owner. What are the possibilities of this industry? I need not tell an intelligent audience what the result would be, if a man of ordinary intelligence should devote his time and best thought and make it a specialty. I might carry these illustrations into every department of agricultural life, to show that farming can be and should be made a success.

Because of the lack of business methods I am not imputing to the farmer a lack of intelligence. I have the highest appreciation of his ability. His employment is an isolated one. He is attempting success where no person can succeed. Why do I say this? It is because in this age of competition, of im-

proved methods and tastes, no man is big enough, no one man has breadth and scope of mind enough, to carry out to their fullest and best results, all departments of agricultural work. Why should not an individual practice law, study medicine, and preach the gospel, at the same time? Simply because no man has the time or the capacity to assume the three professions; if he did he would be judged a lunatic; he would make a botch and a failure of life.

There is a sentiment common among farmers, and it taints all society, that somehow, almost anybody can succeed tolerably well as a farmer, as there is not much about farming but plenty of hard work. Some one has said "any fool can be a farmer." To my mind, if any one entertains such thoughts, he can give no better evidence of his own imbecility than by proclaiming that idea.

One of the strongest elements of success in farming is faith in the soil. As a class, farmers seem to feel that money laid away in the soil is dead property. They do not consider that land reclaimed, pays in a single year a better interest than any savings bank. This is no idle assertion. In my own experience I have demonstrated this over and over again.

The abandoned farms of New Hampshire are so many standing monuments of once faithless owners. Show me a man that re-invests his surplus money in his farm and I want no better evidence that he is on the high road to success. I might point out a long array of conditions that are essential for success. Not the least among them is well directed, earnest labor. There is a mania to-day for soft jobs. This disease when once seated, we mean seated at the corner grocery or the depot, is far more to be dreaded than the tuberculosis. Such creatures are subject to quarantine at the county farm where they will be less contagious.

To make farming a success more depends upon the man than the industry. He must be a live, wide awake, earnest man. He must be abreast with the times. He must be an independent man and not go cringing about thinking he is the mudsill of society. He must not be frightened when clad in

the panoply of labor if he meets the pomp and glitter of a pampered aristocracy.

Success is not measured alone by dollars and cents. While I believe that farming can be made a success financially by bending all our energies in one direction — and thus alone can we excel, thus alone can any man succeed in any profession or industry — yet our ideas of success should cover a broader field than mere dollars and cents. What should form our true idea of success? It is not alone in multiplying our acres and increasing our flocks and herds. Rather is it not true success that uplifts the man as well as the industry? Can we make successful farming possible without first making the man a success? The stream can rise no higher than the fountain. All his labors, all the products of his hands are the reflections of the man within. He who has a keen sense of the possibilities of dairying, whose mind grasps all the laws that govern breeding, feeding, and handling the products, works no harder than the one who blindly plods along in the use of old methods, who comprehends no system, and acknowledges no law that governs development. Did I say that he works no harder? Rather should I not say that such knowledge of the laws of animal life and the laws that enter into the handling of the products lightens his burden and makes his labor cheerful.

We are not among those who believe, as some would have us, that we can carry on our farms by brain power alone, that we can raise our corn without hoeing, do our churning with dog power, and ride over the rocks and stumps on a sulky plow. "He that by the plow would thrive, himself must either hold or drive." If he commits both to other hands he will need to be more successful in obtaining help than most farmers are.

We must not flatter ourselves that the road to success in any branch of farming, is any other than earnest, diligent, persistent labor. If there is any one thing more than another that is casting a gloom over agriculture, yea, over every industry, it is the thought that has taken possession of the

rising generation, that there is no dignity in labor; that it is to be shunned; that by hook or crook, they will get a living without work.

They have an example set before them, by men in high authority, and by lawmakers everywhere. Farmers and laborers should arise unitedly and demand that such examples of profligacy, of utter disregard of honorable service and diligent attention to business, should cease from among us.

I come now to consider briefly, how can success crown this as an industry? There can be but one answer — organized effort. It is only by this means that we can make our influence felt. It is only by this means that those who are advanced in the science of agriculture, can lead up those below them to a higher plane of thought and practice. The Order of Patrons of Husbandry, is doing a noble work in this direction. It is lifting the farmer to a higher plane of thought and labor. It is the first organization that has taken woman by the hand, and bid her come up and aid in making the labors of this life cheerful.

If we would build up the waste places, if we would stay the tide that is constantly setting towards the city, that is draining our rural towns, abandoning the old homestead, we must build up the Grange, and make it a still better educator, for the upbuilding of social and material prosperity of our farming communities. Thus will the church and the school be retained, and these little fountains, the farm homes, remain as they have ever been, the purifiers and upbuilders of our civilization.

The meeting was then adjourned until two o'clock P. M.

AFTERNOON SESSION.

The afternoon session was opened with a song "The Farmer Feeds Us All," by Mrs. G. A. Wason, of Nashua, and Miss Colburn, of New Boston.

THE PRESIDENT: Ladies and gentlemen, we have with us this afternoon a distinguished gentleman from Massachu-

setts, a gentleman who was one of the originators of the Agricultural college at Amherst, and was president of it for several years. He will speak to us upon the subject of the fertility of the soils. I now have the pleasure to introduce to you Professor Stockbridge.

FERTILITY OF THE SOILS.

BY PROF. LEVI STOCKBRIDGE, OF AMHERST, MASS.

Mr. President, Ladies and Gentlemen:

I feel compelled to ask your indulgence this afternoon, for you will find at this moment that I am extremely hoarse. I got that hoarseness in an agricultural occupation. When I come to speak for a few moments, I may be so hoarse that you can scarcely hear me, or that hoarseness may pass away, and my voice be perfectly clear.

The human physician, when summoned to a patient, finds his first duty to be to diagnose the disease; next, to learn as far as possible the history of that disease; and then, as far as possible to learn its cause. If he is a man who understands his business, he will study the natural, original constitution and vigor of his patient, and then he will learn, if possible, the present recuperative power of his subject. After that, he will endeavor to remove the cause of the disease, and finally, he will try to find some remedy which will simply help nature in restoring to perfect health. Now, Mr. Chairman, it seems to me that the man who has to deal with the soil can do no better than to follow the course which would be taken by this human physician. Why, sir, we have all heard over and over again that the soil is sick. We have heard it to-day here in this assembly. We have heard that our soils are sick; that they have lost their natural constitution and vigor in order to produce plants, and we have heard it said that this loss of constitutional vigor has lessened the quality and quantity of our plants. And we know it has done so. We know that it has done so to such an extent that after paying the interest on the capital invested in the land,

and after paying the cost of cultivation and the taxes, the farmer has nothing left. He might as well leave such land, as the speakers of the forenoon have told us they are doing.

Now, this disease to the land is one of the very worst forms of disease, because it is a contagious disease. It is an old disease, and during all the long years no one has been able to administer the remedy. Beginning at Jamestown in 1607, in Massachusetts in 1620, and in New Hampshire in 1623, this disease has spread on and on and on, until the constitutional vigor of our soil is so destroyed that to-day it will not produce one half the crops that our ancestors got from this soil with the most shiftless cultivation; and with the rude tools and instruments that they used, they produced more and better crops than we do to-day. We have been decreasing in the amount of our crops in this eastern section of the country from what was said to be, on the average, a yield of sixty bushels of corn to the acre, until the best State of the Union east of the Appalachian has come down to the average of twenty-six.

MR. CURTIS: The average in New Hampshire for ten years has been thirty-eight.

PROF. STOCKBRIDGE: Well, New Hampshire must be the banner State in the corn crop. You have come down, all over this land, on potatoes, from about three hundred bushels to ninety-seven. Do you get more than that in New Hampshire? I think I am about right on that. You have come down on what was said to be the natural growth of wheat on this soil, from about thirty-five or thirty-six bushels, until now in the Southern States you can get barely seven or eight bushels, and you cannot get in this blessed State of New Hampshire more than about eighteen.

MR. LYMAN: That is about right.

PROF. STOCKBRIDGE: I guess it is lower than that. You have gone down so that it takes very good land, to-day, to give you twelve bushels to the acre. This disease has gone over the great Appalachian chain of mountains and attacked the eastern water-shed of the Mississippi, and has absolutely

crossed that great river. You hear complaints of this disease in Iowa, you find it in Nebraska and in the Red River valley.

Now I have referred to what the disease is, and in speaking of it as I have, I have to some extent spoken of its history. Now the all important thing is to find the cause, if possible. Here we have soil and plant; soil primarily and plant secondarily, soil and plant in conjunction. But we have had this falling off. Some one said this forenoon, and I wanted to say Amen to it, but didn't dare to in this audience, that the greatest national question to-day is, how we can retain the fertility of the soil and maintain these crops that give us the command of the markets of the world. Who said that?

MR. CURTIS: I guess it was Brother Connor.

PROF. STOCKBRIDGE: I think it was.

I come here to-day and ask you, what is the cause. There is not a man here, but what has in his own mind an idea of what the cause is, not one. But if we cannot make certain things practical, it is just as bad as though we did not know anything about them. We want to know what we can do and what we can find that will remedy this disease. Originally, as I have said, these soils were strong and vigorous; and simply by a little tickling, crops were produced which paid abundantly. And to-day we see growing on these lands crops of forests, for the forest growth is nothing but a crop, and you had better harvest it when it is ripe.

Most farmers have a feeling that the crops grow from the ground, but they do not stop to think what is taken from the ground by them. The plant is utterly unlike the soil, but yet it grows up out of the ground, and so we want to start with the proposition that plants never feed upon the soil as soil, nor upon fertilizers as fertilizers.

We know what the soil is made up of physically. We know that there is material in it that we call loam, and there is material in it that we know is simply the material of the rocks, ground down to powder more or less fine. That is what the soil is. But you do not find the organic matters that are in the plants in the same form in the soil. What do you

find? The chemist takes his plants and analyzes them, and tells us that he finds certain things. He finds potash, which is the same acrid, corroding material that you find it to be in the arts. He finds magnesia and soda, he finds sulphuric and phosphoric acids. That is what he finds in the plants, with tissues made up of what is called woody fibre. Now the plant finds those materials in the substance of the soil, and it finds them only after the different materials have been separated from the rock, and made into potash, soda, magnesia, and other substances which are soluble in water. Then the plants, when taking in seemingly only the water, take in these substances which are in solution. Also the plants take substances from the gases of the air, carbonic acid being the principal element.

Now this material thus reduced to plant food is what we want to talk of; that is what we want to understand. This rocky matter and the other elements I have spoken of carry or hold the food material of the plants, and they are eliminated from this rocky element of the soil by certain chemical forces acting in the soil; that process is the process of nature, and no thanks to us up to this point. It is the Lord's work. This work goes on every year, every summer and every winter. I do not care whether or not we are in a land where there is any winter, or in a land where there is only six months of summer, summer or winter nature has provided a way by which this soil is made finer and finer, by which this soil is made more and more solvent, and by which it is reduced to such a condition that the plant rootlets shall absorb it and pass it up the stem of the plant, and thus aid in the production of the plant. Remember that this process has been going on during all time. Remember another thing, that this process of making plant food out of the soil will go on just as long as time lasts. The laws of God and of nature remain the same.

This process was going on in this New England soil of ours year after year, before the Europeans came over to rob it, until the soil was literally surcharged with plant food, abun-

dantly rich in this plant material. The uncultivated New England soil was a regular storehouse or magazine of plant food, ready to be utilized when a man with a head on his shoulders had come here and begun to cultivate it and produce plants. Well, what did that man do when he did come here? He found that condition of things existing and he simply went to work to make plants out of that plant material. He went to work getting his plants and carrying them away, making no recompense and never thinking of returning anything to the soil, but he simply gathered up this plant material which was in the soil and carried it away. That process has now been going on for about three hundred years, more or less, and is it any wonder that the land is sick, sick of such cultivation and of such men as that? Is it any wonder that it has gone down and down, until it is in the condition described? That is the cause of this condition of things. Here you have two forces operating, and the one is very much superior to the other, not in that they do not both always operate, but the one has a greater force than the other. On most of our soils the power of the plant to gather up plant food is superior to the powers of nature in developing plant food out of the soil. Thus when it is carried away, the period must come when the soil becomes in such a debilitated state or condition that it does not pay for cultivation.

Now, Mr. Chairman, we think we have here the cause of this sickness of the soil. But it is one thing to know the cause and it is a very different thing to remedy it. We have found the cause without any trouble. Now how shall we remove the cause? Stop removing this prepared plant food, which is changed into crops, by sending the crops away from the farm. To the men who feel they are patriotic, to the men who heard these ladies sing here this afternoon, I wish to say that that man is not a true patriot or American who encourages the sending away of these crops to foreign countries. But some of these things have got to leave the farm. That is just where the trouble of removing this cause lies. You all know that there are millions and millions of men in this great

land of ours whose labor produces no food in the way of direct crops, millions and millions who have to be fed by somebody. The ladies sang this afternoon, that the farmer fed them all. That means the four or five hundred thousand in Boston, the millions in New York and all the great cities of this land. The farmers feed them all. They have got to have that food. You cannot stop that, and there will be a rebellion if we do not give them enough, and the rivers of the land are made use of as great sewers to carry away this plant food and elements of fertility into the ocean. The same thing is being done on the Atlantic and the Pacific seaboard. But there is no use of our arguing to-day about that. Thus much we have got to lose. Can we stop any part of the drain from the soils of our farms? If so, how? Now I would rather talk to individual man than to any body of men when speaking of these things; I would rather talk to my friend on my right than to all the people in New Hampshire, for I might be able to give him some good advice that I could not give to all of you.

The first point in stopping this waste is to see that every iota of the waste product of the farm is utilized and returned to the soil from which that product came. This is a wonderful time now for using the waste products in this matter of maintaining the fertility of the farm, and supporting our soil so that it can produce crops. We want to utilize every single part of the crop that comes from the farm, and it should be utilized so as to go back on to the farm and thus help sustain the fertility of the soil. That is all simple, perfectly simple. Apply it, gentlemen, then. I have seen men who talked about the way to save the fertility of the farm, and have gone upon their farms, and seen a stream of water running from the eaves of the barn into the barnyard, and from thence into the brook. That is the way they practiced and applied these principles. But that method will not do. It is necessary to utilize carefully and religiously all the waste products that come from the crops of your farms. If you buy crops see that they go back on to your land. That will apply generally to all the farmers of New Hampshire.

Right in here comes the question of what you shall sell from your farm. You perhaps can sell one thing and not hurt it much, or you may sell another, and you will absolutely rob the soil of its fertility. My advice would be, if you have a dairy, don't you sell milk. Keep your milk at home. Sell butter. Why? Because your butter is a carbon-hydrate, and almost all of it comes out of the air, and so by selling that you take little if anything from your farm. The man in the city owns horses, and to feed them he thinks he must have herd's grass. They will give three or four dollars more for it than for clover hay. But one ton of clover hay is worth at least a ton and a half of herd's grass. If you must sell anything of that kind, keep your clover hay at home.

These things are all in the books, and you can find what you are selling. You want to keep those crops at home which contain the best elements of fertility. Otherwise the elements of fertility will be taken from your soil much faster. Every man must be the judge of what he will sell, but I want to tell you as farmers, that by being judicious in this matter, you can keep back a large part of the fertility of the soil, whereas, if you fail in this, your farms will be more quickly depleted of their fertility.

I have already said that nature works on summer and winter. Year in and year out nature is working on and struggling to make as much as she can of the elements of the soil into plant food. That human physician I spoke of, I said would endeavor to find a remedy that would aid nature. I do not believe in drugging a fellow to death. I believe that the true physician is always in real touch with nature, and he will study to use those things which will systematically aid her, but relies upon nature doing the most of the work. So here on the farm, just call nature to your aid, and you aid nature in increasing the fertility and productiveness of the soil, and you will do a most successful work.

To make this practical at once, let me say right here in this line that the thing for the farmer to do is to till the soil and cultivate it. Lay it down as one of the verses in your

Bible that diligent cultivation is absolute fertility. That is not exactly the way it reads, but it is near enough for you practically. Diligent cultivation is absolute fertility.

THE PRESIDENT: Perhaps some of them do not read the Bible.

PROF. STOCKBRIDGE: Then take it from me. I will guarantee it is so. Why? Because if you should seclude the air from this soil of ours it would be absolutely barren. There would be no changing of the elements of the soil into plant food going on in it. Just exclude the air utterly from the soil, and it would practically develop no elements of fertility. On the other hand the more freely the air gets into the soil, the more actual plant food is developed. Therefore, when the farmer puts on the plow and the drag, and grinds this soil all to a fine powder—the finer the better—the natural law works, and the result will be the entering into this soil through the pores, of the carbonic acid and ozone of the air, which will make plant food out of this soil when it would not otherwise be made. Everybody knows that it is a good plan to plow your land in the fall. Plow it in such a way as to open it up as far as possible to the action of the frost. Why, there is no power on earth that is more of a power than frost. You cannot confine it. And the action of the frost on the soil absolutely grinds it; and when it is made fine, then these forces of nature I have spoken of will make plant food, and the smaller the particles of soil, the more thoroughly and quickly the work is done and the more plant food will be developed.

Plow in mid-summer. Why? Because by exposing that soil in mid-summer to the action of the air, it will absorb the ozone of the air more thoroughly and promote nitrofaction, and the result will be that this simple summer fallowing, as we used to call it when I was a boy, will develop more plant food.

I will say this, — perhaps it is not true, but it is so near it that it will put some one to thinking, and I know that in a great many cases it is absolutely true, — let that farmer who

finds it necessary to keep a good team to do his work at certain seasons of the year, while at other seasons it is comparatively idle, at any time from the first of April to the first of November, take that team and plow somewhere on his farm, and he will find that the results will well pay him for the driver, plow, and team. If I had nowhere else to plow, I would set the team at work in the pasture, and then sow grass seed and harrow it in, and would expect to be fully remunerated by the amount of food that it would afterwards produce. Follow that up. It is a practical thing. Follow it up, sometimes in one field and then in another, and I will guarantee that you will find it will pay.

I want to make whatever I say perfectly practical. I do not want it in the air, for I am talking into the ground, and I want to make what I say have some practical results.

There is a good deal said about rotation of crops. I know enough of it to satisfy me that rotation of crops is not the thing for a prosperous farmer who has got a good level head on his shoulders and a little tin in his pocket. It will not avail anything in the end. It may do for a few years while you are getting upon your feet, to first plant a surface feeder and then a deep soil feeder, etc. You can get on a few years in that way, while you are gathering force enough to do something better. So if you are in circumstances that make it necessary, try rotation of crops. Plant a surface feeder one year and a deep soil feeder the next; but mark you, that is only a make-shift for the day, just to keep you going until you can get start enough from some source to work in a more substantial manner.

Now, Mr. Chairman, I am going to hurry on. I can see the end of my thread.

I have already said that you have got to send away some of this plant food. We have got to send cattle to England. You cannot stop it in any way if you try. You have got to send wheat to England. You have got to send millions and millions of tons of absolute plant food away from the home where it grows, away from our God-blessed country, and you

cannot get rid of it. The farmers this year are carrying the happiest faces I have seen for years from the fact that, from the Atlantic to the Pacific, they have got the heaviest wheat crop that I have ever seen; and they are happy because they hope to get \$1.30 a bushel for it. They are happy because they are going to sell these crops away from America, and they are going to make those fellows pay a good price for it. They are going to sell it away from this country. Then what is going to become of this proposition that I started out with? How are we going to keep this at home? I will not take up that question now. It may be profitable to discuss it in some localities. I come to another. The Lord has, in some way or another, contrived to put into our American world the most wonderful reserve forces to make up for the losses caused by man who is carrying away the fertility of the land. We have here at our hands the most wonderful reserve forces which we can apply to, and put back on our land to take the place of what we are constantly taking away. Here I am going to speak of the matter of commercial fertilizers. I may say some things that you will not believe, but I think that whatever I shall say is the truth.

This reserve force we have in the phosphoric rocks in this country. Here we have an inexhaustible supply of these phosphates which we are carrying away from our farms and our country in the bones of our animals which we export to foreign countries. An inexhaustible supply has been provided by nature to make up for that loss. Every year we are finding more and more of it. It was only a few years ago when there was no such supply known. All our phosphates were then made simply from bones. Now, we can go to the phosphoric beds of Charleston, South Carolina, and can get an almost inexhaustible supply of this phosphoric acid, to make up for the loss of the phosphoric acid we send away in our wheat crop. Now, I tell you, and it is God's truth, that phosphoric acid which goes into the wheat crop is precisely the same as that which is obtained in that rocky form and reduced. It is precisely the same thing as it is if you take it out of bones. There is no difference.

Our crops are also carrying away every year vast quantities of potash. That we cannot get here, but we do get it from abroad. While we are sending wheat to Germany, we are bringing back millions of tons of potash from that country. The country there is full of it, and there seems to be no end to it. I can confidently prophesy that the time is not far distant when we shall find the same deposits here in our own country, but to-day we have to bring it from abroad.

Now comes the nitrogen element. The nitrogen, of which the air is largely composed, is, perhaps, the most costly and valuable of all the elements we need to buy. We get this nitrogen on our own soil in the form of refuse from our gas manufacturers and in other ways. Up to this time there has been no failure in the supply, and there is no doubt but what we can get all the nitrogen we need. I hope that some young man who is going to be educated in the New Hampshire Agricultural college will be the man who will find out how to gather it from the air. I honestly believe it is going to come. Why, in this air there is nitrogen enough to supply the growing crops of all the land. We have enough here to produce all the crops that will ever be grown upon this American continent, if we can find the man who will teach us to extract the nitrogen element from the air.

I have only spoken of three elements. In plants we have four organic elements and eight or nine inorganic elements; but practically for the work on the farm all we need to talk about are the three inorganic elements. There are only three inorganic elements that we have to restore. We are all agreed; scientific men are all agreed; and practical men know, that if you take potash, phosphoric acid or superphosphate, and nitrogen, you can make practically a perfect fertilizer. On the average soil of New England, if you take these three elements, nitrogen of the organic, and potash and phosphoric acid of the inorganic world, you have got a fertilizer which will take the place of farmyard manure and all the refuse of the farm, and will enable you to grow crops. It is not my object, nor have I the time to show you my reasons for saying

this, further than I have done ; but I pledge you that any New Hampshire farmer who will take nitrogen, potash, and phosphoric acid — which should be solvent so that the water will take it up, and the plants will gather it from the water — can take the poorest farm in the State of New Hampshire to-day, where there is water enough to carry on the process of dissolving this fertilizer and giving it to the plants, and he need not use any other element whatever ; he can make that farm fertile, and can do it and get pay for his labor at the same time. That is a strong statement, but I have proved it.

Another thing — organic matter is absolutely essential in every soil, but we have put on inorganic matter in this compound I have spoken of. But when you put these plants into the soil, and make them grow in the soil, it will fill the soil with roots. Then you will make clover grow on that soil, and when a man has got a good crop of clover, he knows that he has got over a dangerous bridge.

A VOICE : The trouble is that it winter kills.

PROF. STOCKBRIDGE : Sow it in the spring and plow it in the same year. Plow in the second crop, and you will give to that soil the organic matter necessary to give it a retaining and absorbing power.

I could enlarge upon these things a good deal further, but you see I am getting hoarse. I will try to speak a few moments longer.

In all these matters that I have been speaking of, the question of economy comes in. You can buy a fiddle, and pay too much for it. You have got to grow these crops in such a way that you will get pay for your labor. The question of economy must come in everywhere, and so it must enter into the question of the use of these fertilizers which I have spoken of — potash, soda, nitrogen, and phosphoric acid. Supposing you have got potash enough in the soil, do you want to buy any more to put on ? Supposing you have phosphoric acid enough, supposing you have nitrogen enough, do you want to pay eighteen cents a pound for nitrogen when you have got enough ? No, you do not. Any body knows you do

not. But are you wise enough to tell me whether you have got enough of any one of these elements or not? Can you tell me you have got potash enough in your soil, and do not need to apply it? Can you tell me that you have got phosphoric acid enough — I mean in the elements which will be developed into plant food? Can you tell me you have got nitrogen enough? If you can, and know it, you are all right and can save your money. Now, every man should be sufficiently intelligent, to-day, to know so much of the condition of his soil. He should know it by absolute observation and experiment in trying his crops. He should know enough of his own acres to be able to determine that. By that means he can save dollars and dollars.

QUESTION: How is he to know this? By the development of the plants he raises?

PROF. STOCKBRIDGE: Here is the trouble with that method. You put in a fertilizer made this year without any potash and produce a perfect crop. You are perfectly satisfied with your crop and you say that your soil has potash enough. Now perhaps that year you have drawn off all the potash that you had in the soil, and if you go on the principle that you have enough potash in your soil the next year, the crop may be a failure, although you may have put on your phosphoric acid and nitrogen, it being the rule that the quantity of the minimum element in the soil will measure the maximum crop. Now a man of your intelligence will not need my personal advice upon that subject. I know you can, as a Yankee, guess pretty near what to do. But if I am to speak to the farmers of all the State of New Hampshire upon this subject, I would say that in these fertilizers we have an abundance of material to keep up the plant food on our farms, and I can tell you of no other way than to use nitrogen, potash, and phosphoric acid. Some men may know how to do it economically, but the most of the men of New Hampshire cannot know which of these elements is the most needed, and the only way I see is for him to use them all.

I beg your pardon for stopping here, but I will be very

much obliged to you if you will excuse me. I could talk for an hour longer upon this subject, if I were not so hoarse.

THE PRESIDENT: We have a gentleman with us to-day that you have heard speak before upon this subject, doubtless. I have the pleasure of introducing to you Professor Whitcher of Hanover.

REMARKS BY PROF. G. H. WHITCHER.

Mr. Chairman, Ladies and Gentlemen:

I do not propose to speak very long. I remember very well the first time I ever listened to a lecture on the subject of plant food. It was at Concord in the representatives' hall in the state house. The lecture was given by Professor Levi Stockbridge, the gentleman who has spoken to you this afternoon. We will call it that he is not here now. I will say that it was the best speech I ever heard in that hall excepting the great railroad arguments of a session or two ago. He spoke there upon the subject of plant food, in 1877 or 1878. It was the first time I ever heard that subject touched upon. It called to my mind, as I believe it did to the minds of everybody present, the fact that there was such a thing as plant food. I had heard very little about it at that time. The name of Professor Stockbridge was not connected with plant food and the subject of rations as it has been since. This was all practically new at that time. Now the good seed fell from his lips and I presume that it fell upon stony ground in many cases and it was choked out by weeds in many other cases. But the seed that was planted there by that lecture, and subsequently top-dressed by the labors of Professor Sanborn at the New Hampshire Agriculture college and the work done by other men connected with various colleges, has given us a desire to doctor the sick soil. The medicines that are used in doctoring the sick soil are very much better than many of those used to doctor the human body. Ayer's Hair Vigor may be a very good thing to color grey hair black, and Beecham's pills are all right if anybody wants them. But all of those things are

trash, a good many of them are nothing but cheap whiskey. But when you come down to the subject of doctoring the sick soil the medicine has been prepared on a scientific basis, and I do not know of any man in the United States that has been more instrumental in giving us a rational formula than Professor Stockbridge. I know very well the basis that he is working on, and you all know it very well.

There is one thing that has come to my mind here to-day, and I wish to bring out that one point. While Professor Stockbridge was speaking, the parable of the sower came to my mind, and I thought that that parable might be well applied here. Professor Stockbridge by his lectures and by this lecture to-day has scattered over the State this seed, which has got to produce fruit, but the yield depends entirely upon the ground on which it falls. Some of the seed in the parable, you know, did not yield very well. If you go home from this meeting to-day and do not think any more of this subject, you will be the stony ground and you will lose the profits of this talk. If on the other hand you go home and consider the subject carefully and apply the principles to practice, then you will see that fruit will come of it.

Mr. Connor asked the question how he was going to know what his soil lacked in order to raise good crops. The only way to know is to find out by actual experiment on your own soil and under your own conditions of cropping, whether you want nitrogen, phosphoric acid, or potash, or all three or two of them, or what not.

There are one or two things that I wish to caution you about. It is always customary to criticise a speaker more or less. Professor Stockbridge said that if you have teams that are not otherwise employed, plow your pastures. That is all right to do with some pastures, but the professor has not tried, nor experienced the agony of plowing some of our New Hampshire pastures. It would be a risky job to attempt.

He says that he wants some of the graduates of the New Hampshire Agricultural college to find out how to get this free nitrogen out of the air. I do not think that would do.

In the first place I think it would be a very risky thing, for if a way should be found in which it could be got in the form of a commodity you might soon find that there was a tax placed on, or a trust formed to control, this free air that God has given us.

Just one thing more and I am done. Think very carefully about what the professor has said in regard to the rational system of doctoring your soil. I do not doubt but that there are some here who have got sick soil. Some of it is very sick, some is just beginning to be sick, and some has been sick and is getting better. That is the kind we want to see. We want more of it in that condition. There is a rational way of doctoring this soil and you have got to do it in that way or give up farming in New Hampshire. You cannot sit down and say: My great grandfather produced good crops without any particular system and why cannot I. The time is past for doing that. These times we must put into practice these scientific methods that we have heard about. Next year put into practice what the professor has said to you to-day. See what your soil needs and apply that. He spoke of the economical side of this fertilizing question. It will not pay you to doctor your soil five dollars' worth and get one dollar and fifty cents in return. You want to doctor it one dollar and fifty cents and get five dollars in return. Can you do it? It depends entirely upon the man. There is no professor that you can find on earth, who can tell you how to make money farming. There are certain principles of chemistry relating to this subject of plant growth that a chemist can tell you about, but just how you shall treat your soil and just what you shall grow must be decided by yourselves.

QUESTION: And you have to depend upon the market?

PROF. WHITCHER: Yes sir. We can tell you something about what your plants need. Professor Stockbridge has given you suggestions about how to doctor your soil. But you have got to determine what will pay, whether it is better to raise onions or cabbages. We cannot tell you what crop is best. We cannot tell you whether a ton of Stockbridge fertilizers

or of Bradley's manures, in your condition of soil will give you back more than what you pay for them or not.

This, Mr. President, is all I have to say here to-day.

THE PRESIDENT: Ladies and gentlemen, I now have the pleasure of introducing to you Mrs. Alonzo Towle, of Freedom, who will speak to you on this occasion. It gives me great pleasure to have a lady speak to us at this time.

REMARKS OF MRS. ALONZO TOWLE OF FREEDOM.

Mr. President, Members of the Board of Agriculture, Sisters and Brethren:

It no doubt seems very strange to you this afternoon to have a lady introduced to you under the auspices of the Board of Agriculture. You will say to yourselves, this is a new departure. But why not? Are men alone interested in agriculture? Does it depend only upon our husbands, brothers, and fathers that we are successful as a farming community? If not, then why not? I have often thought when hearing of the good results of your farmers' institutes, and how many of your evening sessions were well attended by the ladies, how much they must be interested in their own business and that of their husbands that they should attend these meetings when you give so little attention to their work, and in but very few instances is occasion given us to say anything for ourselves.

The subject that I would like to talk about especially is woman's work, and the education of our farmers' girls. If I understand the matter rightly, what you grangers are in quest of is to establish a class of men who will be successful tillers of the soil. In your judgment you have taken the initial, the first step, when you take them at as early an age as practical and educate them in the line of agriculture. This is well, but have you gone far enough? Have you in your thought seen a power underlying all other powers, a factor that must be recognized in the sum total of their young lives, a secret agent which explains many unexplainable facts of

the past? Who have furnished our large towns and cities with their most successful business and professional men? Who have furnished nearly all places with health of body, sterling qualities of mind, and sound judgment? Surely, only the farmers' wives. What has created this restlessness that has been so prevalent among our young people within the past twenty-five years? What has filled them with this heart-rending ambition and discontent, that has caused them to seek here, there, and everywhere for something, they know not what? I answer you by saying it was transmitted from the mother blood. Our grandmothers and great-grandmothers who settled upon our farms were women who were contented with their lives. They had no other ambition than to do their work as well as they could and raise large families of children. They knew nothing of the world, and cared less. They had no other lives to compare their own lives with. Therefore they were contented because they were far removed from the centres of civilization. They lived their lives of integrity and died in peace. Then came another generation. By electricity and steam we are brought close to the cities. Women began to see other lives, began to see that there was a city culture, that there was a difference between their lives and those of their city sisters. They grew discontented. While they recognized their own innate qualifications, and those of others around them, they knew that they had lacked opportunities. These women of the country are strong, independent women. They were discontented, but they would not deign to acknowledge it. This repressed life has stamped itself upon the generation following, and now, while you see them struggling here and there for an education and taking every means to perfect it, you see this restlessness. It is there and you cannot blot it out. How can women who are sick and tired of farm life, weary and disgusted with its drudgery, give prenatal nourishment and vitality to a race of men who will love rural life and its conditions? Is it possible?

You want a class of men who will look with intense satis-

faction upon our broad, green fields, our dark, deep forests, and great streams. Can you do it by education? You may in a measure. To do this thoroughly, you must begin with the mothers. Take the girl of to-day. She comes to her wedding-day with little or no idea of her responsibilities as mother or wife. She thinks she has knowledge enough to pilot her through the first years of housekeeping, because housekeeping for two is not a great deal. She soon finds there are cares and emergencies not thought of before. She finds that she is totally unable to meet them. She often wonders if she is quite herself at all times, as the closeness of domestic life has brought out so many traits not recognized before. Then, too, her hand is not as deft as when the good mother was at her side to teach her out of her many years of hard bought experience. And with the mother there was never any methodical training. It has always been a running of risk for results in this the most important part of women's work. What has been the result of this hazard work? Some by dint of courage and perseverance come out triumphant as our best housekeepers. But ask those women to-day how it would have been, if they had begun their lives where they found themselves at the end of ten years, and they will tell you that ten years more of happiness would have been added to their lives. Another class become discouraged. The family breaks. One drifts here, the other there. The last, though not by any means the least in numbers, go on day after day making the same mistakes, the same to-day as yesterday, to-morrow as to-day. The little children begin to fill the vacant places at the table. We see their little blue, dyspeptic faces, and they tell us how an evil thing is silently but surely at work undermining their health, and cheating them out of all their future. It is then that the mother looks back into the past with sorrow, and forward into the future with fear. Sisters, it has long been recognized that woman's influence was a telling power in all intellectual and moral life. Is it more so than when she stands at the moulding board, and is dealing out to those she loves best either those

things that will nourish, sustain, and make them better, or something that will poison their blood and ruin them forever? Alas! how many hearts have been broken, and ties severed because this king of physical being — the stomach — has rebelled. How many men have been sent to their cups and drunkards' graves; how much of sin and sorrow and of misery! Many women are seeking for a mission. Here is a field so broad that it covers the whole earth, and so high that it reaches up to the stars.

What shall we do then? Educate them. Develop them intellectually and morally, and also teach them scientifically in their own line of work. Open the doors of your academies, seminaries, and schools of learning.

Provide in your schools opportunities whereby she may learn domestic economy and the culinary art. Give them a beautiful symmetrical education, which is the education of the woman, and prepares her for happiness and for the home.

Now, brothers, do not say that because you are farmers, your girls only need the most meager education. If there is a class of women on the face of this broad earth that deserve to have every avenue of happiness opened to them, it is the farmers' wives. They richly deserve it, and it will be well for you to look to it and see that they have it.

I saw in a paper the other day an article where one woman in referring to the housewifery art, calls it a lower order of work. That is one thing that tells against it. There is a class of women, they mean well perhaps, but they have not looked at both sides of the question, they ever say "a lower order of work" when they speak of the culinary art. Yet it takes just as much skill to prepare a meal scientifically and lay a perfectly appointed table, as it does to execute the finest piece of classical music. It requires as much ethical knowledge to raise a family of boys and girls and bring them up successfully to manhood and womanhood, as to write the finest modern essay. And, my good sisters, it takes as much of the grace of God for us to live at peace with our husbands, our children, and our neighbors, as for the minister of God to live in peace with his wife, children, and neighbors.

All professions, nearly all business and trades are open to women and a great many are taking advantage of that. I find no fault with them. I bid them God-speed. If the Great Father has given to any woman a special gift, it is her duty to improve upon that gift. But while they are so well provided for they must allow us the same privilege.

What have you done for the large class of women who are our home-makers and housekeepers? Yes, what? I ask you to-day for them. Just a little way from this, almost in the geographical centre of your State, you will soon have a beautiful college. It is yours. It does not belong to any one else; it is all yours. It was given to you. And now you will have everything you wish. Money is a great power in these things, and financially you are independent. I ask you, brothers, that you will see to it, that that college is furnished with just what I have asked you for. And I ask you, mothers and farmers' wives, that you will see to it that your girls are sent there.

A few words to those sisters who are in middle life, you who have come up to the thirties, the mothers who are just going out of the forties, your hands must be extended to the older ones to steady their steps as they go down toward the grave, your help must also be given to those coming after you, and thus in all your works you must labor, reaching out with the right hand and the left. God bless your efforts.

To those who have gone on before, who have passed the working part of life, all we ask of you is to shine, shine. Shine by your kind words and friendly acts, shine in the sweetness and goodness of your age, for soon we shall pass to that time when we shall have no future, when we shall have only the past. Then, if we have not filled our past with good deeds, we shall have no pleasant memories.

Brothers, remember that "amid all that is bright and beautiful in nature, there is nothing which blooms with such unfading colors; there is no perfume on earth so fraught with fragrance, as the flowers of good works and the sweet smelling savor of that pity which feels for the wants and relieves the distresses of our brothers and sisters."

THE PRESIDENT: We have present with us the Secretary of the Board of Agriculture of New Jersey. We will close our meeting by listening to a few remarks from him, Mr. Franklin Dye of New Jersey.

REMARKS BY HON. FRANKLIN DYE,
SECRETARY STATE BOARD OF AGRICULTURE OF NEW JERSEY.

Mr. President:

It would be a great pleasure to me to talk to this audience for an hour or more and emphasize many points that have been brought to your notice to-day. But the time is short, you are tired, and it would be an imposition to do so.

I heard of this meeting accidentally, and either accidentally or providentially, I am here. I wanted a little rest, and I thought I would take it and at the same time look at the New Hampshire people.

Let me call your attention to what you already know, the importance of the farmers' calling, the farmers' business. You know how, in the past few weeks, the whole world has been looking with the most interest at the products of the farms of this country. The business world has been at a stand still waiting for the possible results of the farmers' hard work and the farmers' wives' hard work, for I speak of the farmers' wives, as I go about my own State. All this indicates the importance of your work.

It was my privilege two or three years ago to go before that august body, the Ways and Means committee of Congress. I said to them that for twenty-five or thirty years, the manufacturing interests had their committees at Washington, they had stayed there, they had labored there, and their demands were heard and they were granted what they asked. But it was otherwise with the farmers. The farmers had no committees there, they had not asked for much and consequently they had been neglected and the importance of the farming community had not been brought to the attention of Congress. I mentioned two or three reasons why their wants should be con-

sidered. One was because the farmers were the greatest taxpayers of the nation; also, they are interest payers, have been so to too great an extent, as you all know. Another point that I laid before that committee was that if the statesmen neglected the farmers' interest, they must soon expect the country itself, as a republic, to go down. Farmers must have an interest in their country, and that interest can be augmented by enabling them to own their homes. I said to them we must depend upon the children of our farmers to uphold these grand institutions. And these things are so. The more prosperous the farmers, the more prosperous is the country.

Our sister spoke a few moments ago about the hard lives of the mother and daughter upon the farm. Since their eyes have been opened, it is not pleasant. To remedy this, we want to make the farmers' homes the most attractive homes on earth. Dear friends, let me emphasize this thought and let me talk to you as I talk to the wives and mothers of our own State. You are struggling to help your husbands make the farming pay, but do not forget the most important crop of all, the farmer's child. Is it not something to be the mothers of statesmen, ministers, and of all good citizens. And if it is true, and it is, that the prosperity of our God-given institutions does depend upon the farmers, then, mothers and fathers, give close attention to the cultivation of this most valuable crop. Do not let it be said of you as a young lady said to her father, in my own State, I am sorry to say: "Father, you think more of your hogs than of your daughter." A gentleman in speaking of the fashions of Boston says that it is the fashion there for the mother to send the nurse with her pretty child and the baby carriage into the park, while she goes out with a pet dog. Is it love when a mother is ashamed to take her own offspring and care for it and would rather ride out with a poodle dog than with her own child? Let us attend to this matter. I say to you in New England: Take care of this most important crop.

We look forward to the time, and hope it will come, when there will be no abandoned farms in your New England. We

have reached a state of cultivation of the land, never before reached, and by these means, I think it will soon come.

God bless the farmers; they are the bone and sinew of the land and hope of the nation.

SPECIAL MEETING AT CONCORD.

A special meeting of the State Board of Agriculture was held at the office of the Board, State House, Concord, Wednesday, Dec. 31, 1890, for hearing the report of the committee of Investigation in regard to the Thompson will and for taking action thereon.

Present, President Humphrey, Vice-President Philbrick, Messrs. Thompson, Lyman, Towle, McDaniel, Perry, Wasson, Covell, and the secretary.

The Thompson will was read by the secretary, after which the following report was made by Alonzo Towle, chairman of the committee appointed at the annual meeting:

REPORT OF COMMITTEE OF INVESTIGATION ON THE PROVISIONS OF THE THOMPSON WILL.

Mr. President and Members of the State Board of Agriculture:

Your committee have attended to their duties and submit the following report:

We have made investigation of the records, in the office of Register of Probate for Strafford county, of the will of Benjamin Thompson, late of Durham, and find the property invested as follows: The figures being the market value of same as determined by the appraisers.

Real estate	\$18,300.00
Bonds	60,795.00
Bank stock	40,093.00
Railroad stock	249,048.00
Manufacturing stock	9,291.00
Land stock	125.00
Deposit Strafford National Bank	14,172.74
Deposit Strafford County Savings Bank	15,948.47

Cash	\$215.00
Household furniture	232.50
Farming tools	
	<hr/>
	\$408,220.71

By provisions of said will no interest is required to be guaranteed upon the real estate valued at \$18,300.

This deducted from the total value of the property leaves \$389,920.71 on which the State is required to guarantee a net annual compound interest of 4 per cent, which for the present year would be \$15,596.83.

In addition to this amount the State is required to appropriate \$3,000 annually, making a total for the present year of \$18,596.83. It has been ascertained from good authority that the present annual income of the property as now invested is about \$19,500.

Deducting from this amount \$15,596.83 which the State is required to guarantee at 4 per cent interest and \$3,000 to be appropriated, leaves a balance of \$903.17 that the State will realize after complying with the provisions of the will.

Your committee have ascertained that in the opinion of the executors, fortified by that of competent financial experts, the future income of the invested funds will not be less than, and may considerably exceed the amount of the present income; from all which it would appear that the net annual income from the invested funds and cash on hand will be more than sufficient to cancel the four per cent interest upon the property devised, required to be paid by the State, and also the three thousand dollars per annum and interest thereon required to be furnished by the State for the period of twenty years, according to the provisions of the will.

In view of these facts in addition to the educational advantages to be derived, your committee respectfully recommend that the State accept the provisions of the will of said Benjamin Thompson, late of Durham.

ALONZO TOWLE, M. D.,
CHAS. McDANIEL,
N. J. BACHELDER,

Committee.

A discussion followed the reading of the report, participated in by all members present.

Voted, That the report of the committee be adopted.

Voted, That the president of the Board appoint a committee of three to draft a bill to be introduced in the Legislature, accepting the provisions of the Thompson will. The president appointed Messrs. Towle, McDaniel, and Secretary Bachelder as the committee.

No further business appearing the Board adjourned.

N. J. BACHELDER,
Secretary.

ANNUAL MEETING AT HAMPTON.

The Board met in annual session at Boar's Head, Hampton beach, Wednesday, August 26, being the last Wednesday in August, at 7.30 o'clock P. M. and was called to order by President Moses Humphrey. The members present were Philbrick, McDaniel, Perry, Thompson, Towle, Lyman, Wason, and Secretary Bachelder.

The records of the previous meeting having been printed, the reading was dispensed with.

Voted, To hold the annual winter meeting at Newport in Sullivan county, January 13 and 14, 1892 and the president, secretary, and county member were constituted a committee to arrange the programme.

Voted, That the time and place of holding the several county institutes be referred to the secretary and member from the respective counties.

Voted, That the by-laws be so amended that the annual meeting shall be held at the office of the Board in Concord on the third Wednesday in August.

Voted, That the next annual field meeting be held at Boar's Head, Hampton, on the day following the third Wednesday in August, 1892.

Voted, That the arrangement of the programme for the annual field meeting be referred to the president and secretary. No further business appearing the Board adjourned.

N. J. BACHELDER,
Secretary.

APPENDIX.

APPENDIX.

LAWS OF JANUARY SESSION, 1891.

[FROM PAMPHLET LAWS.]

CHAPTER 12.

AN ACT TO ACCEPT THE PROVISIONS OF THE THOMPSON WILL, AND TO PROVIDE FOR THE PRESENT DISPOSITION OF THE FUNDS.

WHEREAS, Benjamin Thompson, late of Durham, in this state, died January 30, 1890, leaving a will and codicils thereto, which have been proved, approved, and allowed by the probate court of the county of Strafford, by which he devised a large share of his property to the state of New Hampshire, in trust, for the establishment and maintenance of a school or college, to be located on his "Warner farm," in said Durham, wherein there shall be thoroughly taught, both in the schoolroom and in the field, the theory and practice of agriculture, and other sciences connected therewith, and wherein there may be taught such other arts and sciences as may be necessary to enable the state to fully avail itself of the donation of land made by the act of the congress of the United States approved July 2, 1862, entitled "An act donating land to the several states and territories which may provide colleges for the benefit of agriculture and the mechanic arts;" and,

WHEREAS, Said bequest is made subject to certain provisions, conditions, and limitations set forth in the will and the

codicils thereto, to which reference is made for the particulars thereof; and,

WHEREAS, By one of said conditions it is provided that said bequest shall become null and void if the state does not accept the trust within two years from the time of the decease of said Thompson; now, therefore,

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. That the state of New Hampshire does hereby gratefully accept said bequest, subject to the provisos, conditions, and limitations set forth in said will, as modified by the codicils thereto, and, in consideration thereof, does hereby promise to execute said trust in accordance with the terms of said will.

SECT. 2. The state, in compliance with the requirements of said will and codicils, promises and guarantees to appropriate, and does hereby appropriate annually, for the term of twenty years from and after said Thompson's death, such sum as will pay a net annual compound interest of four per cent per annum upon the amount of the appraised value of the estate bequeathed and devised to the state as aforesaid, aside from the real estate situated in said Durham, after deducting therefrom the legacies given by the codicils to said will, and does hereby authorize and direct the state treasurer to credit said sums to the trust fund, as provided in the fourth section of this chapter.

SECT. 3. The state, in further compliance with the requirements of said will and codicils, promises and guarantees to appropriate, and does hereby appropriate annually for the term of twenty years from and after said Thompson's death, the sum of three thousand dollars, and such further sum as will pay a net annual compound interest of four per cent per annum upon said annual appropriations from the dates when they severally become a part of the trust fund until the expiration of said term of twenty years, and does hereby authorize and direct the state treasurer to credit said sums to the trust fund, as provided in the following section.

SECT. 4. The state treasurer, upon receipt of the estate devised to it by said will and codicils, shall open two accounts in a book provided for the purpose, as follows: He shall open one account with "The Benjamin Thompson Trust Fund," and shall credit therein to said fund, under date of January 30, 1891, the amount of the appraised value of the estate received by the state by virtue of said Thompson's will, together with a sum equal to four per cent upon said appraised value (not including the real estate situated in said Durham), and on the thirtieth day of January in each year thereafter until and including January, 1910, excepting when such day falls on Sunday, and in such cases on the day preceding, he shall credit to said account a sum equal to four per cent upon the total amount of said trust fund, excepting the appraised value of the real estate in said Durham. after the credits of the preceding year have been made. He shall open the other account with "The Benjamin Thompson State Trust Fund," and shall credit therein to said fund, under date of January 30, 1891, the sum of three thousand dollars, together with a sum equal to four per cent upon said sum of three thousand dollars, and on the thirtieth day of January in each year thereafter, until and including January, 1910, excepting when such day falls on Sunday, and in such cases on the day preceding, he shall credit to said account a sum equal to four per cent upon the total amount of said trust fund after the credits of the preceding year have been made.

SECT. 5. The accounts so made shall represent the amount of the trust funds in the possession of the state; and the state guarantees to preserve them intact and unimpaired until they shall become available for opening and maintaining said school or college, and then to administer them as required by said will.

SECT. 6. The state treasurer is hereby authorized to receive from the executors of said will the money, notes, bonds, stocks, and evidences of debt coming to the state by virtue of the will, and to give proper discharges therefor in the name of the state.

SECT. 7. If any notes, bonds, stocks, or evidences of debt shall come to the state treasurer from said executors as a part of said estate, he may, with the approval of the governor and council, convert the same into money, — selling the stocks and bonds by auction at the Boston Stock Exchange, or such other place in Boston as property of that kind is usually sold.

SECT. 8. All notes, bonds, stocks, and other evidences of debt coming into the possession of the treasurer and not converted into money as aforesaid shall be transferred to the state and be carefully preserved by the treasurer. The governor and council may authorize any person to vote upon any of such stocks at meetings of stockholders of the corporations to which the stocks appertain, and may authorize a sale and transfer thereof whenever they deem it to be for the interest of the state.

SECT. 9. The governor and council are authorized to sell and convey any real estate coming to the state by virtue of the said will, which the state has power to sell, in such manner and at such time as they shall think for the interest of the state, and may make and execute in the name of the state proper conveyances thereof, upon payment of the consideration therefor to the state treasurer.

SECT. 10. All money received from the sources aforesaid shall be used as soon as practicable after its receipt in paying and retiring outstanding indebtedness of the state; and the state treasurer shall keep an itemized and true account of all money and securities of any kind so received and of the disposition made of the same and of the proceeds thereof, and shall give a full account thereof in his annual reports and shall state in each annual report the exact condition of said funds.

SECT. 11. The board of agriculture is hereby authorized and directed in behalf of the state to receive possession of the real estate in Durham coming to the state by virtue of said will, and to care for, control, and manage it until it is needed for the uses of the school or college to be established as provided in the will.

SECT. 12. The board shall make report of their doings in respect to such real estate in their annual reports.

SECT. 13. In case the state shall desire to establish said school or college at any time before the expiration of twenty years from the time of the decease of the said Thompson, it shall, before using any of either of the funds aforesaid, raise and set apart such sums of money as will make said funds equal in amount to what said funds would become if accumulated during twenty years; and having thus raised and set apart such sums of money, the state shall thereafter be relieved from the obligation of appropriating annually for the balance of the said term of twenty years the said sum of three thousand dollars, and guaranteeing the net annual compound interest of four per cent thereon; and the state shall also be thereafter relieved from the obligation to provide for or guarantee any interest upon the amount of the appraised value of said estate, as hereinbefore provided.

SECT. 14. The governor and council are authorized in behalf of the state, to make and enter into such further stipulations with the executors of said will and to give such further guarantees as the executors shall require to secure the objects intended by said Thompson to be secured by his will and codicils, and to affix the name and seal of the state thereto, and to do all other acts that may become necessary to secure the rights of the state under said will.

SECT. 15. The said will and codicils shall be recorded in the office of the secretary of the state.

SECT. 16. This act shall take effect and be in force from and after its passage.

CHAPTER 40.

AN ACT TO CONSTITUTE A STATE BOARD OF CATTLE COMMISSIONERS.

Be it enacted by the Senate and House of Representatives in General Court Convened:

SECTION 1. That for the purpose of facilitating and encouraging the live stock interests of the state of New Hampshire,

and for extirpating all infectious and contagious diseases, especially tuberculosis, that now are or may be among cattle, a state board of cattle commissioners is hereby created, to consist of the secretary of the state board of agriculture, the master of the state grange, and the secretary of the state board of health, who shall be charged with the execution of the provisions of this act, whose powers and duties shall be those provided for in this act, and whose compensation shall be fixed by the governor and council. Any vacancies occurring in the board from any cause shall be filled by appointment by the governor and council. The said commission shall respectively take an oath faithfully to perform the duties of their office, and shall immediately organize as such commission by the election of one of their number as president thereof, and proceed forthwith to the discharge of the duties devolved upon them by the provisions of this act.

SECT. 2. That it shall be the duty of the said commissioners to cause investigation to be made as to the existence of tuberculosis, pleuro-pneumonia, foot and mouth disease, and any other infectious or contagious diseases among cattle, and such commissioners, or their duly constituted agent, are hereby authorized to enter any premises or places, including stock yard, cars, and vessels within any country or part of the state in or at which they have reason to believe there exists any such disease, and to make search, investigation, and inquiry in regard to the existence of said disease therein. Upon the discovery of the existence of any of the said diseases, the said commissioners are hereby authorized to give notice, by publication, of the existence of such disease and the locality thereof, in such newspapers as they may select, and to notify in writing the officials or agents of any railroad, steamboat, or other transportation company doing business in or through such infected locality, of the existence of such disease; and are hereby authorized and required to establish and maintain such quarantine of animals, places, premises, or localities as they may deem necessary to prevent the spread of any such disease, and also to cause a disinterested appraisal of the animal or

animals affected with the said disease, in accordance with such rules and regulations by them as hereinafter authorized and provided, and also to cause the said animals to be destroyed, and to pay the owner or owners thereof one half of their value, as determined upon the basis of health before infection, out of any moneys in the treasury not otherwise appropriated: provided, however, that no appraised value shall be more than one hundred dollars for an animal killed; and provided, further, that in no case shall compensation be allowed for an animal destroyed under the provisions of this act, which may have contracted or been exposed to such disease in a foreign country, or on the high seas, or that may have been brought into this state within one year previous to such animal showing evidence of such disease; nor shall compensation be allowed to any owner who in person, or by agent, knowingly and willfully conceals the existence of such disease, or the fact of exposure thereto, in animals of which the person making such concealment, by himself or agent, is in whole or in part owner.

SECT. 3. That the said commissioners are hereby authorized and required to make, record, and publish rules and regulations providing for and regulating the agencies, methods, and manner of conducting the investigations aforesaid, regarding the existence of said contagious diseases; for ascertaining, entering, and searching places where such diseased animals are supposed to exist; for ascertaining what animals are so diseased; or have been exposed to contagious diseases; for making, reporting, and recording descriptions of the said animals so diseased, exposed, or destroyed, and for appraising the same, and for making payment therefor; and to make all other needful rules and regulations which may, in the judgment of the commissioners, be deemed requisite to the full and due execution of the provisions of this act. All such rules and regulations, before they shall become operative, shall be approved by the governor and thereafter published in such manner as may be provided for in such regulations; and after such publication said rules and regulations shall have the

force and effect of law, so far as the same are not inconsistent with this act and other laws of the state or the United States.

SECT. 4. That any person or persons who shall knowingly and willfully refuse permission to said commissioners, or any one of them, or their duly constituted agent, to make, or who knowingly, and willfully obstructs said commissioners, or any one of them, or their duly constituted agent, in making all necessary examinations of, and as to animals supposed by said commissioners to be diseased as aforesaid, or in killing the same, or who knowingly attempts to prevent said commissioners, or any one of them, or their duly constituted agent, from entering upon the premises and other places hereinbefore specified where any of said diseases are by said commissioners supposed to exist, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, or of any of the acts in this section prohibited, shall be punished by fine not exceeding one hundred dollars, or by imprisonment not exceeding ninety days, or by both fine and imprisonment, at the discretion of the court.

SECT. 5. That any person who is the owner of, or who is possessed of any interest in any animal affected with any of the diseases named in section 2 of this act, or any person who is agent, common carrier, consignee, or otherwise is charged with any duty in regard to any animal so diseased, or exposed to the contagion of such disease, or any officer or agent charged with any duties under the provisions of this act, who shall knowingly conceal the existence of such contagious disease, or the fact of such exposure to said contagion, and who shall knowingly and willfully fail, within a reasonable time, to report to the said commissioners their knowledge or their information in regard to the existence and location of said disease, or of such exposure thereto, shall be deemed guilty of a misdemeanor, and shall be punishable as provided in section 4 of this act.

SECT. 6. That when the owner of animals, decided under the provisions of this act, by the proper authority, to be dis-

eased, or to have been exposed to contagion, refuses to accept the sum authorized to be paid under the appraisement provided for in this act, it shall be the duty of the commissioners to declare and maintain a rigid quarantine as to the animals decided as aforesaid to be diseased, or to have been exposed to any contagious or infectious disease, and of the premises or places where said cattle may be found, according to the rules and regulations to be prescribed by said commissioners, approved by the governor, and published as provided in the third section of this act.

SECT. 7. That no person or persons owning or operating any railroad, nor the owner or owners or masters of any steam, sailing, or other vessels, within the state, shall receive for transportation or transport from one part of the state to another part of the state, or to bring from any other state or foreign country any animals affected with any of the diseases named in section 2 of this act, or that have been exposed to such diseases, especially the disease known as tuberculosis, knowing such animals to be affected, or to have been exposed thereto; nor shall any person or persons, company or corporation, deliver for such transportation to any railroad company or to the master or owner of any vessel, any animals, knowing them to be affected with or to have been exposed to any of said diseases; nor shall any person or persons, company or corporation, drive on foot, or transport in private conveyance, from one part of the state to another part of the state any animal, knowing the same to be affected with or to have been exposed to any of said diseases. Any person or persons violating the provisions of this section shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by fine not exceeding the sum of two hundred dollars, or by imprisonment not exceeding six months, or by both fine and imprisonment.

SECT. 8. That it shall be the duty of the several county solicitors to prosecute all violations of this act which shall be brought to their notice or knowledge by any person making the complaint under oath; and the same shall be heard in the supreme court.

SECT. 9. That the said commissioners are hereby authorized to appoint or elect one of their number as secretary of said board, who shall receive a reasonable compensation for his services during the time in which, under the provisions of this act, the services of the said commissioners shall be required. The said commissioners shall make and preserve a full record of all rules and regulations promulgated under the provisions of this act, of all payments and expenses hereunder incurred, and all other transactions performed by said commissioners in the discharge of their duties as herein provided; and the said commissioners shall, on or before the first Wednesday in January of each year, during their continuance in service, and at other times as they may deem conducive to the public interests, or as they may be required to do by the governor of the state, report to said governor full and accurate accounts of their expenditures, and other proceedings under the provisions of this act, and of the condition of said diseases, if any, in the state, to be communicated by him to the legislature. Whenever the functions of said commission shall be suspended or terminated, it shall turn over to the secretary of state all its books, papers, records, and other effects, taking his receipt therefor, and he shall remain the custodian of the same until such time as the functions of said commission may be restored.

SECT. 10. That the commissioners shall have the power, and are hereby authorized to employ skilled veterinarians, and such other agents and employés as they may deem necessary to carry into effect the provisions of this act, and to fix the compensation of the person or persons so employed, and to terminate such employment at their discretion; and they are authorized to make such expenditures as may be needed for the actual and necessary traveling expenses of themselves and their said employés, stationery, expenses of disinfecting premises, cars, and other places, destroying diseased and exposed animals, and paying for the same, and such other expenses and expenditures as they may find to be actually necessary to carry into effect properly the provisions of this act.

SECT. 11. That at any time, should it become an actual necessity to declare a quarantine against any or all animals entering within the borders of the state, for the public health and safety, it shall be the duty of said commission to confer with the governor and council, and they may adopt measures to prevent the spread of infectious and contagious diseases in the state, to remain in force until the safety of the state and the approval of the commission and the governor and council allow the repeal of said measures of quarantine.

SECT. 12. That all bills and expenses incurred under the provisions of this act shall be approved by the commission, and audited by the governor and council, and the expenditures shall not exceed ten thousand dollars in any one year, to be paid from the state treasury, on the order of the governor, out of any moneys not otherwise appropriated.

SECT. 13. That chapter 93, Laws of 1889, and all other acts and parts of acts inconsistent with this act are hereby repealed.

CHAPTER 52.

AN ACT PROVIDING FOR THE REMOVAL OF THE NEW HAMPSHIRE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS FROM HANOVER TO DURHAM, AND FOR OTHER PURPOSES.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. The trustees of the New Hampshire College of Agriculture and the Mechanic Arts, located at Hanover, in this state, are hereby instructed and required to terminate the location and agreement made and concluded on the seventh day of April, eighteen hundred and sixty-eight, between the said New Hampshire College of Agriculture and the Mechanic Arts and Dartmouth College, by giving one year's notice of such termination, in writing, to the trustees of Dartmouth

College as soon as practicable after the time when this act shall take effect, in accordance with the terms of said agreement, and of the act of incorporation of said New Hampshire College of Agriculture and the Mechanic Arts.

SECT. 2. Upon the termination of the location and agreement aforesaid, the said New Hampshire College of Agriculture and the Mechanic Arts and the Experiment Station connected therewith, shall be removed from Hanover to and located upon the "Warner farm," so called, of the late Benjamin Thompson, in the town of Durham, devised by the said Thompson to the state of New Hampshire by his last will and testament.

SECT. 3. The trustees of the New Hampshire College of Agriculture and the Mechanic Arts are hereby authorized and directed to sell, at public or private sale, the real estate, with the buildings thereon, acquired by them by the deed of John Conant, dated September 16, 1870, and recorded in the Grafton county registry of deeds, book 324, page 87, and all other real estate owned by said college in the town of Hanover, reserving the right to occupy the same until the removal of said college as hereinbefore provided, and to invest the proceeds of such sales, so far as the same shall be derived from the sale of the land conveyed to said college by said Conant, in accordance with the terms expressed in his deed, and the balance of said proceeds in aid of the erection and furnishing of buildings for the use of said college upon said Warner farm.

SECT. 4. Upon the termination of the location and agreement aforesaid, the state shall and it does hereby relinquish to the trustees of Dartmouth College all claim to the building known as Culver Hall, erected at Hanover in coöperation with the trustees of Dartmouth College under the provisions and authority of section 6 of an act approved July 9, 1869, entitled "An act to promote the interests of the New Hampshire College of Agriculture and the Mechanic Arts," and thereupon the said trustees of Dartmouth College are hereby requested to refund to the state the sum of fifteen thousand

dollars appropriated by the act aforesaid in aid of the erection and furnishing of said Culver Hall. The said sum of fifteen thousand dollars, when the same shall be refunded to the state, shall be and is hereby appropriated in aid of the erection and furnishing of the buildings required for the use of said college upon said Warner farm.

SECT. 5. The general government of said college of Agriculture and Mechanic Arts is vested in a board of thirteen trustees, and all vacancies hereafter occurring in said board shall be filled as follows: The governor of the state and the president of said college shall be trustees *ex officio*. The alumni of said college may elect one trustee in such manner as said board may prescribe. He shall be a resident of the state and his term of office shall be three years. All other trustees shall be appointed by the governor, with the advice of the council, one at least from each councilor district, and so classified and commissioned that the office of three trustees shall become vacant annually. Not more than five of the trustees appointed by the governor and council shall belong to the same political party, and at least seven of them shall be practical farmers. Seven members shall constitute a quorum for doing business, and not less than seven affirmative votes shall be required to elect a president of said college.

SECT. 6. The sum of one hundred thousand dollars is hereby appropriated for the removal of said college from Hanover to Durham, and the erection and maintenance of suitable buildings for the purposes of said college; and the treasurer of the state is hereby authorized, under the direction of the governor and council, to issue bonds or certificates of indebtedness in the name and in behalf of the state, for the whole or any part of said sum, in the same manner and subject to the same conditions as are provided in the act approved March 19, 1891, entitled "An act to provide for refunding maturing bonds and authorizing a temporary loan," and said bonds or certificates of indebtedness issued by authority of said act, and those issued by authority of this act, are hereby consolidated into one series, and the governor is authorized to

draw his warrant on the treasurer for said sum, from time to time, as the same shall be needed, and the same shall be paid to the treasurer of said College of Agriculture and the Mechanic Arts, and expended under the direction of the trustees of said college.

SECT. 7. Section 11 of the act approved March 5, 1891, entitled "An act to accept the provisions of the Thompson will, and to provide for the present disposition of the funds," is hereby amended by striking out the words "The Board of Agriculture is," and inserting in place thereof the words, "The trustees of the New Hampshire College of Agriculture and the Mechanic Arts are," so that said section, as amended, shall read: "Section 11. The trustees of the New Hampshire College of Agriculture and the Mechanic Arts are hereby authorized and directed, in behalf of the state, to receive possession of the real estate in Durham, coming to the state by virtue of said will, and to care for, control, and manage it until it is needed for the uses of the school or college to be established as provided in the will."

SECT. 8. This act shall take effect and be in force from and after the day on which the estate devised and bequeathed to the state by the said Benjamin Thompson shall be turned over to and become the property of the state. The state treasurer is hereby required to notify the trustees of said College of Agriculture and the Mechanic Arts, in writing, of the reception of said estate immediately after it shall be turned over to the state as aforesaid.

SECT. 9. All acts and parts of acts inconsistent with this act are hereby repealed.

CHAPTER 60.

AN ACT TO PREVENT THE DESTRUCTION OF SHEEP AND OTHER DAMAGES BY DOGS.

SECTION 1. Every owner or keeper of a dog three months old or over shall annually, on or before the thirtieth day of

April, cause to be registered, numbered, described, and licensed for one year from the first day of the ensuing May, in the office of the clerk of the city or town wherein said dog is kept, and shall cause it to wear around its neck a collar distinctly marked with its owner's name and its registered number.

SECT. 2. An owner of a dog may at any time have it licensed until the first day of the ensuing May; and a person becoming the owner or keeper of a dog after the first day of May, not duly licensed, shall cause it to be registered, numbered, described, and licensed as provided in the preceding section.

SECT. 3. The fee for every license for a year shall be two dollars for a male dog and five dollars for a female dog, and such proportionate sum for licenses for dogs becoming three months of age after the first day of May, or which may be brought from out of the state after the first day of May, as the remaining portion of the year bears to the sum required for a license for a whole year.

SECT. 4. Every license issued to the owner of a dog shall have printed thereon a description of the symptoms of the disease in dogs known as hydrophobia, said description to be supplied by the secretary of the state board of health, lunacy, and charity, to the clerks of the several cities and towns, upon application therefor.

SECT. 5. Clerks of cities and of towns shall issue said licenses, and receive the money therefor, and pay the same into the treasuries of their respective towns or cities on or before the first day of June of each year, retaining to their own use twenty cents for each license, and shall return therewith a sworn statement of the amount of moneys thus received and paid over by them. They shall also keep a record of all licenses issued by them, with the names of the keepers or owners of dogs licensed, and the names, registered numbers, and descriptions of all such dogs.

SECT. 6. Each city and town treasurer shall keep an accurate and separate account of all moneys received and expended by him under the provisions of this chapter relating to dogs.

SECT. 7. A license duly recorded shall be valid in any part of the state, and may be transferred with the dog licensed.

SECT. 8. Whoever keeps a dog contrary to the provisions of this chapter shall forfeit fifteen dollars, five dollars of which shall be paid to the complainant, and ten dollars to the treasurer of the city or town in which the dog is kept.

SECT. 9. Whoever wrongfully removes the collar from or steals a dog licensed and collared as aforesaid shall be punished by fine not exceeding fifty dollars; and whoever wrongfully kills, maims, entices, or carries away such a dog shall be liable to its owner for its value in an action of tort. Whoever distributes or exposes a poisonous substance, with intent that the same shall be eaten by a dog, shall be punished by a fine not less than ten nor more than fifty dollars.

SECT. 10. The assessors shall annually make a list of all dogs owned or kept in their respective cities or towns on the first day of April, with the owners' or keepers' names, and return the same to the city or town clerk on or before the first day of May. An owner or keeper of a dog who refuses to answer or answers falsely to the assessors, relative to the ownership thereof, shall be punished by fine of not less than ten dollars, to be paid into the town treasury.

SECT. 11. The mayor of each city and the selectmen of each town shall annually, within ten days from the first day of May, issue a warrant to one or more police officers or constables, directing them to proceed forthwith either to kill or cause to be killed all dogs within such city or town not licensed and collared according to the provisions of this chapter, and to enter complaint against the owners or keepers thereof; and any person may, and every police officer and constable shall, kill or cause to be killed all such dogs, whenever and wherever found. Such officers, other than those employed under regular pay, shall receive one dollar for each dog so destroyed, from the treasurers of their respective cities or towns. All bills for such services shall be approved by the mayor of the city or the selectmen of the town in which said dogs are destroyed, and shall be paid from moneys received under the provisions of this chapter.

SECT. 12. Each police officer or constable to whom the warrant named in the preceding section is issued shall return the same on or before the first day of July following, to the mayor or selectmen issuing the same, and shall state in said return the number of dogs killed, and the names of the owners or keepers thereof, and whether all unlicensed dogs in his city or town have been killed under the provisions of this chapter, and whether complaints have been entered against all the persons who have failed to comply with said provisions.

SECT. 13. The mayor of each city and the chairman of the selectmen of each town shall annually, within ten days from the first day of July, transmit a certificate, subscribed and sworn to, stating the issue of the warrant named in section 11, and whether the same has been duly executed and returned agreeably to the provisions of this chapter, to the county solicitor of said county, who shall prosecute all such city and town officers as have failed to comply with said provisions.

SECT. 14. Every owner or keeper of a dog shall forfeit to any person injured by it double the amount of the damage sustained by him, to be recovered in an action of tort.

SECT. 15. Any person may kill a dog that suddenly assaults him while he is peaceably walking or riding without the inclosure of its owner or keeper; and any person may kill a dog that is found out of the inclosure or immediate care of its owner or keeper worrying, wounding, or killing neat cattle, lambs, or other domestic animals.

SECT. 16. Whoever suffers loss by the worrying, maiming, or killing of his sheep, lambs, fowls, or other domestic animals by dogs, may inform the mayor of the city or one of the selectmen of the town wherein the damage was done, who shall proceed to the premises where the damage was done, and determine whether the same was inflicted by dogs, and, if so, appraise the amount thereof if not exceeding twenty dollars; if in the opinion of said mayor or selectmen the amount of said damage exceed twenty dollars, he shall appoint two disinterested persons, who, with himself, shall appraise the amount thereof; and in either case, he shall return a certifi-

cate of the same, on or before the first day of December, to the selectmen, who, during the month of December, shall examine all such bills, and, if any doubt exists, may summon the appraisers and all parties interested, and make such examination as they may think proper, and shall issue an order upon the treasurer of the town or city in which the damage was done, for the amount, all or any part thereof, as justice and equity may require. The treasurer shall annually, on the first Wednesday of January, pay all such orders in full, if the gross amount received by him for dog licenses and not previously paid out under the provisions of this chapter relating to dogs is sufficient therefor; otherwise he shall pay such amount pro rata upon such orders, in full discharge thereof. The appraisers shall receive from the city or town treasurer, out of moneys received under the provisions of this chapter relating to dogs, one dollar each for every such examination made by them; and the mayor or selectmen acting in the case shall receive twenty cents per mile one way for his necessary travel.

SECT. 17. The owner of sheep, lambs, or other domestic animals worried, maimed, or killed by dogs, shall have his election whether to proceed under the provisions of the preceding section 14 or of section 16; but, having signified his election by proceeding in either mode, he shall not have the other remedy.

SECT. 18. In the absence or sickness of the mayor, it shall be the duty of any one of the aldermen of the city, who may be duly informed of damage supposed to have been done by dogs, to discharge forthwith the duties imposed by section 16 upon the mayor.

SECT. 19. The mayor and aldermen of a city or the selectmen of a town may order that any dog or dogs within the limits of such city or town respectively shall be muzzled or restrained from running at large during such time as shall be prescribed by such order. After passing such order and posting a certified copy thereof in two or more public places in such city or town, or, in case a daily newspaper is pub-

lished in such city or town, by publishing such copy in such newspaper, the mayor and aldermen or selectmen may issue their warrant to one or more of the police officers or constables of such city or town, who shall, after twenty-four hours from the publication of such notice, kill all dogs found unmuzzled or running at large contrary to such order.

SECT. 20. Said police officers or constables shall be compensated for service under the preceding section as provided in section 16.

SECT. 21. The mayor and aldermen or selectmen may cause special service of any order to be made upon any person, requiring that a dog owned or kept by him shall be muzzled or restrained from running at large, by causing a certified copy of such order to be delivered to him; and if he refuses or neglects for twelve hours thereafter to muzzle or restrain such dog as so required, he shall be punished by a fine not exceeding twenty-five dollars.

SECT. 22. Any city or town officer who refuses or willfully neglects to perform the duties imposed upon him by the provisions of this chapter relating to dogs shall be punished by fine not exceeding one hundred dollars, to be paid into the town treasury. Any person aggrieved by such refusal or neglect on the part of a city or town officer, may report the same forthwith to the county solicitor of his county.

SECT. 23. The city council of any city and any town may make such additional by-laws and regulations concerning the licensing and restraining of dogs as they deem expedient, and may affix penalties not exceeding ten dollars for a breach thereof; but such by-laws and regulations shall relate only to dogs owned or kept in such city or town; and the annual fee required for a license shall in no case be more than one dollar in addition to the sum required by section 3.

SECT. 24. All fines and penalties provided in the preceding sections relating to dogs may be recovered on complaint before a police, district, or municipal court, or (trial) justice in the town or county where the offense is committed.

SECT. 25. This act shall take effect and be in force from and after its passage.

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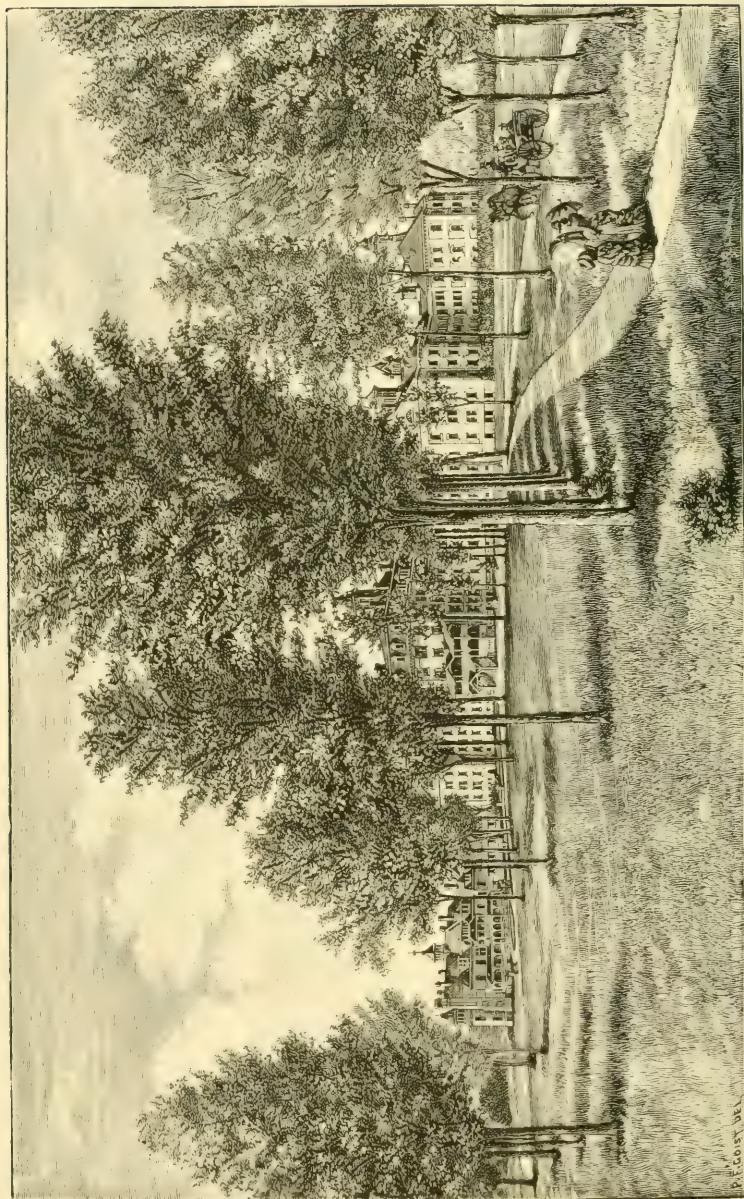
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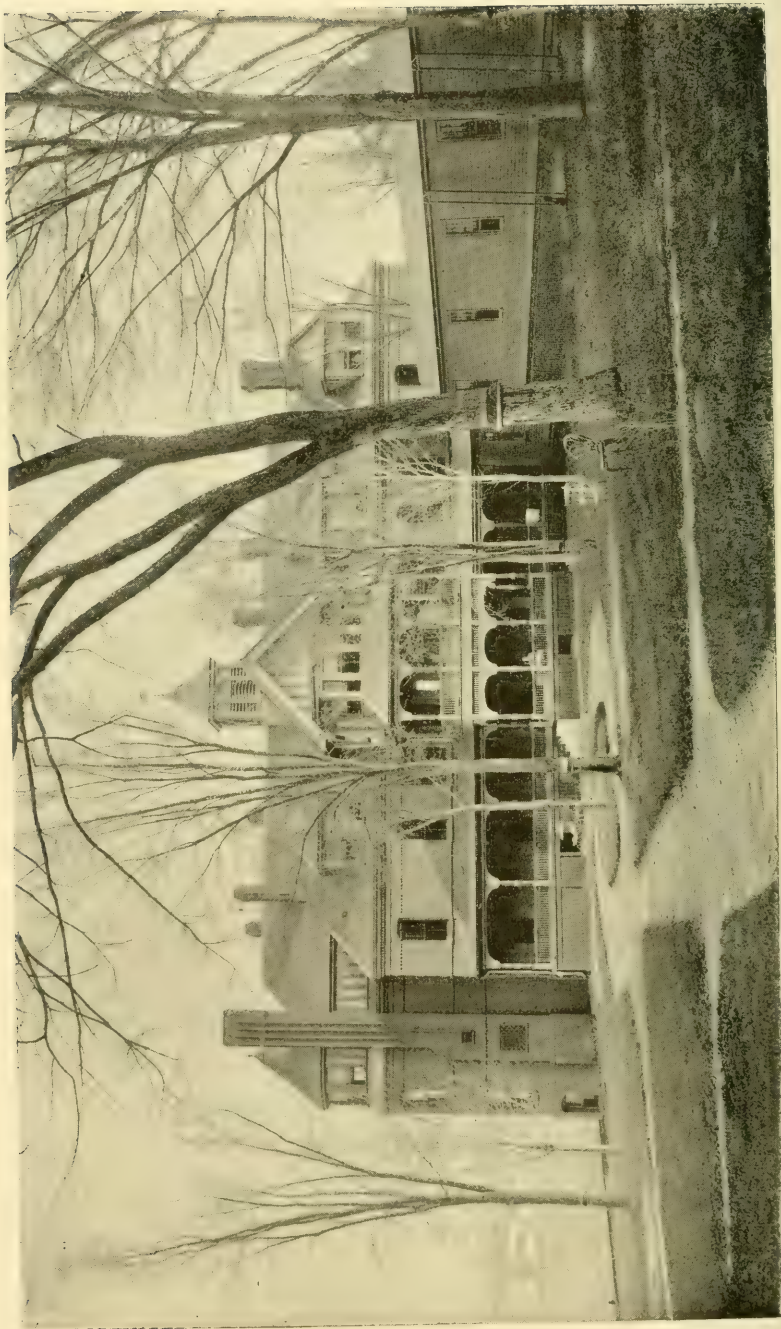
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NEW HAMPSHIRE ASYLUM FOR THE INSANE.

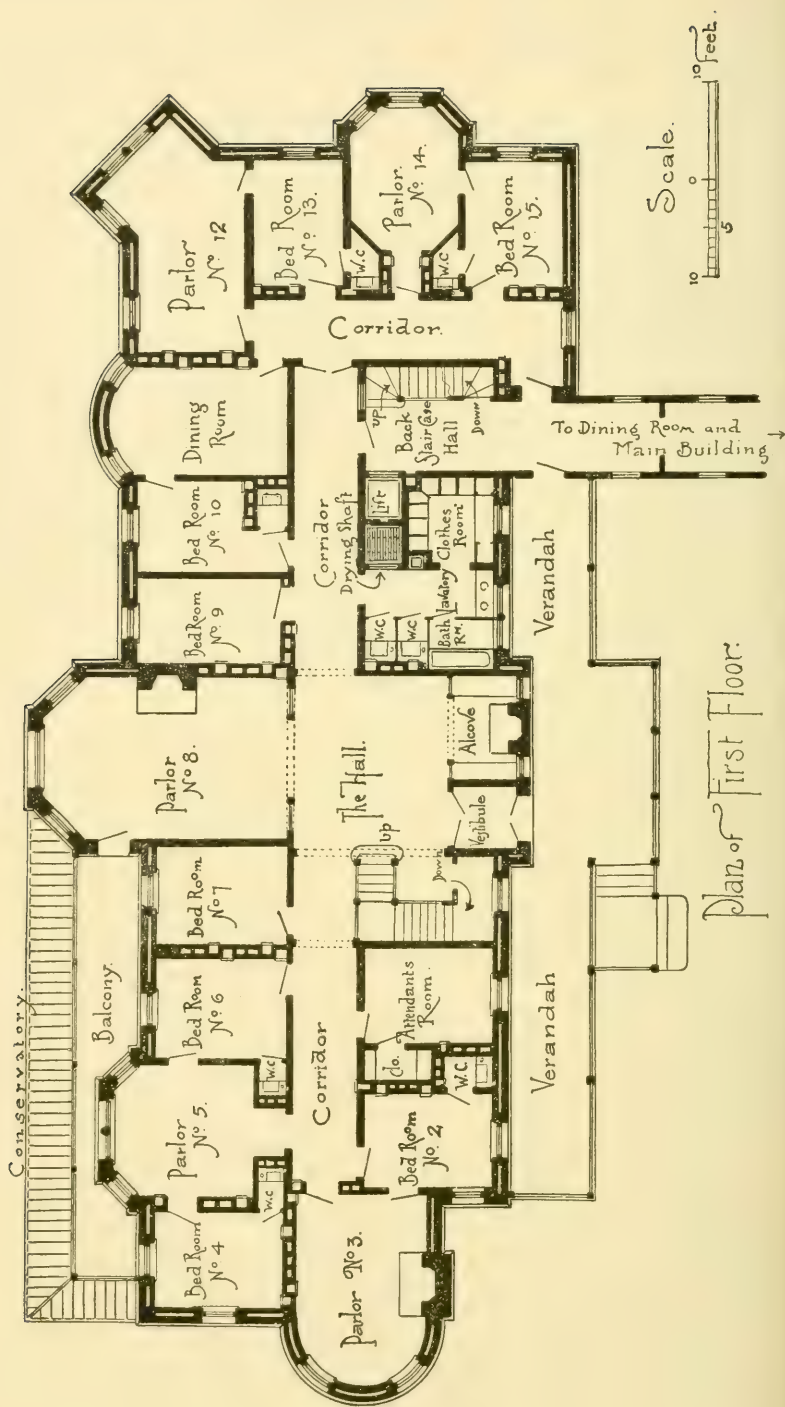
P. F. GOIST DEL.



BANCROFT BUILDING. — FROM THE NORTH.



BANCROFT BUILDING. — FROM THE SOUTH.



ANNUAL REPORTS

OF THE

BOARD OF VISITORS, TRUSTEES, SUPERINTENDENT,
TREASURER, AND FINANCIAL AGENT

OF THE

NEW HAMPSHIRE

ASYLUM FOR THE INSANE

TO THE

GOVERNOR AND COUNCIL,

NOVEMBER, 1891.

VOLUME I, PART II.

CONCORD:

IRA C. EVANS, PUBLIC PRINTER.

1891.

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OFFICERS OF THE INSTITUTION.

BOARD OF VISITORS.

(EX OFFICIO.)

HIS EXCELLENCY HIRAM A. TUTTLE.

HON. JAMES FARRINGTON,	} <i>Councilors.</i>
HON. HENRY B. QUINBY,	
HON. GEORGE A. RAMSDELL,	
HON. JOHN M. WHIPPLE,	
HON. EDWIN C. LEWIS,	

HON. JOHN McLANE, *President of the Senate.*

HON. FRANK G. CLARKE, *Speaker of the House of Representatives.*

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REV. J. E. BARRY, Concord.

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WATERMAN SMITH, Manchester.

MORRIS CHRISTIE, M. D., Antrim.

EDWARD SPALDING, M. D., Nashua.

WM. H. H. MASON, M. D., Moultonborough.

RESIDENT OFFICERS.

C. P. BANCROFT, M. D.	. . .	<i>Superintendent.</i>
EDWARD FRENCH, M. D.		<i>First Assistant Physician.</i>
A. C. NASON, M. D.	. . .	<i>Second Assistant Physician.</i>
A. D. REAGAN, M. D.	. . .	<i>Assistant Physician.</i>
MR. J. H. CARR	. . . .	<i>Clerk and Steward.</i>
MRS. FANNY B. CARR	. . . .	<i>Housekeeper.</i>

VISITING COMMITTEE FOR 1891-92.

FIRST HALF OF MONTHS.

Nov.,	1891.	WHOLE BOARD OF TRUSTEES.
Dec.,		E. A. HIBBARD.
Jan.,	1892.	DR. C. P. FROST.
Feb.,		DR. E. SPALDING.
March,		DR. MORRIS CHRISTIE.
April,		DR. WILLIAM G. PERRY.
May,		REV. F. D. AYER.
June,		E. A. HIBBARD.
July,		DR. W. H. H. MASON.
Aug.,		DR. GEORGE B. TWITCHELL.
Sept.,		DR. W. H. H. MASON.
Oct.,		DR. MORRIS CHRISTIE.

SECOND HALF OF MONTHS.

Nov.,	1891.	WHOLE BOARD OF TRUSTEES.
Dec.,		REV. F. D. AYER.
Jan.,	1892.	DR. GEORGE B. TWITCHELL.
Feb.,		DR. E. SPALDING.
March,		REV. J. E. BARRY.
April,		J. B. WALKER.
May,		J. B. WALKER.
June,		REV. J. E. BARRY.
July,		DR. C. P. FROST.
Aug.,		DR. WM. G. PERRY.
Sept.,		WATERMAN SMITH.
Oct.,		WATERMAN SMITH.

REPORT OF THE BOARD OF VISITORS.

STATE OF NEW HAMPSHIRE.

EXECUTIVE DEPARTMENT.

CONCORD, November 20, 1891.

The Governor and Council, President of the Senate, and Speaker of the House, a board of visitors of the New Hampshire Asylum for the Insane, having visited the asylum as required by law, are of the opinion that the design of the institution is carried into full effect by the present able and judicious management.

HIRAM A. TUTTLE, *Governor.*

JAMES FARRINGTON,

HENRY B. QUINBY,

GEORGE A. RAMSDELL,

JOHN M. WHIPPLE,

EDWIN C. LEWIS,

Councilors.

JOHN McLANE,

President of the Senate.

FRANK G. CLARKE,

Speaker of the House of Representatives.

REPORT OF THE TRUSTEES.

To His Excellency the Governor and to the Honorable Council:

The Trustees of the New Hampshire Asylum for the Insane present this, their

FORTY-NINTH ANNUAL REPORT.

It gives us pleasure, at the close of another year, to announce to your Honorable Body the continued prosperity of the asylum. During the last twelve months much earnest and conscientious work has been done for the amelioration of the condition of those committed to its care. Gratifying results have followed. These you will find detailed at length in the accompanying report of the Superintendent.

FINANCES.

We also transmit herewith the reports of the Treasurer and of the Financial Agent, which state succinctly the financial condition of the asylum on the thirtieth day of September last, the close of its fiscal year.

DR. JESSE P. BANCROFT.

On the thirtieth day of April, 1891, Dr. Jesse P. Bancroft, who had been long and intimately connected with the asylum, passed peacefully from this to another life, at the mature age of seventy-six years.

Between the two earliest hours of the morning, the angel with the inverted torch summoned him, in his chamber, to the higher duties of a higher life.

Dr. Bancroft was of good old English stock, and was born at Gardiner, Mass., on the seventeenth day of June, 1815. He was fitted for college at Andover, Mass., and graduated at Dartmouth in 1841. Choosing the profession of medicine, he afterwards pursued his studies with the late Professor Peaslee, then a resident of Hanover, and graduated at the Dartmouth Medical School in 1844. He had previously devoted some time to teaching, and was, for a time, a demonstrator of anatomy in the medical school, at Brunswick, Maine.

In 1845, he commenced the practice of his profession at St. Johnsbury, Vt., where he acquired not only an extensive business, but a reputation for marked ability as a physician, and a high character as a man. Two years after going to St. Johnsbury he was married to Miss Elizabeth Speare, of Hanover, who survives him. Here he resided for twelve years, and until an invitation, tendered him by the Board of Trustees of the New Hampshire Asylum for the Insane to accept the superintendency of that institution, induced his removal to Concord.

An interest in psychological science was, perhaps, one strong motive which influenced his removal. He entered upon the discharge of his official duties, as superintendent of this institution, on the fifteenth day of July, 1857, and pursued them continuously, with now and then a limited vacation abroad, until 1882—a period of twenty-five years. Few American superintendents can be found whose terms of service have been as long. His tenure of the office of treasurer was still longer, beginning in 1857, and ending in 1890. During the forty-

nine years of the Asylum's active existence, he has served it as treasurer for no less than thirty-three. The subsequent history of his life is so closely interwoven with that of the Asylum that the two cannot be dis-united.

The care of the insane in New Hampshire may be separated by lines somewhat vague into three distinct periods.

1. That of abuse and cruel neglect, resulting in part from parsimony, in part from ignorance, and in part from fear. This period extends over some two hundred years — from the first settlement of the State to the erection of the asylum, in 1841-42. It reaches, indeed, a little beyond this latter date, inasmuch as many guardians of insane persons did not immediately avail themselves of the humane provisions of the institution. The chain and staple, the county jail, the private cage, and the unwarmed chamber or outhouse, which long use had sanctioned as restraints of persons deemed mad and feared, passed into disuse but slowly.

2. The second period, in which humane confinement, medical aid when needed, and a monotonous diet were the principal remedial agents, extended through the dawn which separates the black darkness of the first from the cheering light of the third. The treatment of this interval was far in advance of that of the preceding, inasmuch as intelligent care was substituted for ignorant neglect, and uniform kindness for hard indifference.

3. The third period, to continue the illustration, began with the morning and has advanced with the strengthening light of advancing day. Then, for the first time, a more intelligent benevolence aided by applied science, an enlarged understanding of mental

disturbance, and better architectural conveniences came to the help of those to whom the welfare of the insane had been intrusted.

It was early in this third period that Dr. Bancroft was called to the superintendency of the New Hampshire Asylum for the Insane. The late Dr. John E. Tyler, his immediate predecessor, who had discharged the duties of the office with marked ability, left it when he entered, and in a highly prosperous condition. The asylum structure had just been enlarged by the erection of the Rumford wing, and of the older portion of the Peaslee building. The patients numbered some one hundred and seventy, and it had accommodations for some fifty or sixty more.

Dr. Bancroft entered upon the discharge of his duties on the fifteenth day of July, 1857. In accordance with a previously existing custom, which has prevailed in this institution almost from its opening, he had been made both superintendent and treasurer. If this usage has been uncommon in institutions of a similar character, it has ever proved satisfactory in New Hampshire, a fact which may be due, in part, to the good fortune of the asylum, in having had superintendents possessed of good business capacity, and in part to the fact that, under this system, the agent for the expenditure of the asylum's money has also been the agent for its collection and has had, consequently, a constant knowledge of the condition of its treasury. It has also subserved the convenience of parties wishing to make payments at times outside general business hours. Under this system, no conflict of authority is liable to occur, the whole management being intrusted to a single executive officer, responsible only to the trustees.

The new superintendent very soon mastered the gen-

eral routine of his daily duties, and began to study the broader requirements of the work committed to his execution, and the instrumentalities at his command. He was not slow in discovering that he was to be hampered in his efforts by structural defects in the asylum buildings, and by the limited resources at his command.

One of the first facts to arrest his attention was the imperfection of the warming apparatus. This had been introduced a few years before (1855) when steam heating was in an experimental state. Each of the four wings of the asylum was dependent upon one immense steam coil, some sixty feet long, inclosed in an air chamber in its basement. This was tapped by numerous flues intended to convey heat to the wards above. From this system two evils resulted, and each was a serious one. The warm air ducts proved capricious, some delivering heat to the halls above as they were expected to do, and some abstracting and conveying it back to the air chambers whence it came. It was also found that condensation had occurred before the steam had made the circuit of the coil.

The only sure result, in most instances, was an imperfect warming of the wards and rooms. The problem, therefore, claiming the earliest possible solution was an effectual remedy for this evil—a simple problem now, but one whose solution had not then been reached. Dr. Bancroft gave to it much attention, and relief was found in the substitution of numerous small coils, placed in separate air chambers of corresponding sizes, for the larger ones, and in assigning to each of these a specific work in proportion to its capacity. This modification of the system, involving much labor and large expense, removed the evil. Since then, the asylum has been satisfactorily warmed. While the

sizes and shapes of the coils and air chambers have been repeatedly changed, the great principle underlying the modification has been found to be a sound one.

Dr. Bancroft had not been long in office before another structural defect of the asylum buildings also claimed his attention, as the cause of the imperfect ventilation, which had both perplexed and annoyed him. Upon examination, the exit flues, made for the removal of vitiated air from the halls and rooms, were found to be but four inches square and very roughly plastered. These, inadequate at the beginning, had been rendered almost wholly inoperative by collections of dust and cobwebs.

While the remedy of this evil was patent, it involved the enlargement of every flue in the older wings of the asylum — a work which could be prosecuted but slowly and at much inconvenience to the inmates. But this was imperative, was boldly undertaken, and carried forward for several seasons until fully accomplished. Now, it would be hard to find more perfectly warmed or better ventilated halls than those of the early built wings of this asylum.

All the older parts of the asylum were constructed in accordance with a plan in vogue fifty years ago, which provided for long ranges of rooms in each story, opening upon a long hall common to all, and lighted only at one or both ends. When the room doors were closed, these halls, which furnished the common sitting-rooms of the patients, were dimly lighted, and depressing in their influence upon the minds of their occupants.

The remodeling of these, in such a manner as would admit in abundance the light of day and the cheering influences sure to accompany it, was still another of the problems which devolved upon the superintendent for

solution. Nor did he shrink from it. Ere long, the dull monotony of dreary corridors was made light by the occasional removal of closed rooms, and the construction of bay windows, or the enlargement of windows already existing. Better furniture was introduced and pictures. At the same time, the dining-room furnishings were greatly improved, and the table was made more attractive. In a word, an agreeable domesticity was introduced, and superseded the systematic dullness, which, more than confinement, makes asylum life irksome. It is hard for one who has only known these halls since their renovation, to appreciate the extent and value of the change thus wrought.

No branch of asylum practice has made greater progress during the last fifty years than that of the treatment of violently excited patients. In the original construction of the asylum, two brick arches in the basement of the Kimball wing were set apart for this purpose, and fitted up according to the ideas then prevailing. They were made secure by floors and fronts of plank, but were, in that location, necessarily damp and dismal, the more so in winter, as they were furnished with no means of warming. A person of a sound mind even and sound body could endure unharmed, for a brief period only, a confinement in one of these. To the honor of the asylum, it may be said, that they were tolerated but for a short time, and were soon superseded by a brick building containing sixteen rooms wholly above ground, fairly lighted, and warmed when necessary. But even these became unsatisfactory in a few years, as they furnished to their inmates little beside animal comfort and confinement.

This building, however, did service for some eight or ten years, and until a better one, now known as the

older part of the Peaslee wing, was secured. The erection of this marks an era in the improved treatment of this class of patients. Its accommodations were far in advance of those of a similar kind afforded by most other asylums in the country. These afforded to patients the utmost possible liberty consistent with their best welfare, enhanced their physical comforts, and made practicable increased attention on the part of their attendants. They also allayed much of the excitement before experienced, and demonstrated the evil of undue restraint. Then, as now, this building adjoined the Chandler wing on the men's side of the house. Two of its wards were assigned to male, and one to female patients.

As the number of the asylum's patients increased, from time to time, the accommodations of this building became inadequate, and the erection of another of similar character, with such modifications as experience had suggested, for the use of women, became imperative.

The design of this building was intrusted mainly to the superintendent. It was to stand upon ground of a lower level than that occupied by the existing buildings, and to have an immediate connection with the west end of the Rumford wing. Up to this time (1867), the stories of all additions to the asylum had been made to correspond with the low stories originally adopted, which had long proved objectionable. Experience with the strong building before mentioned, had suggested some enlargement of rooms and corridors, higher stories, improved ventilation, and the introduction of a dining-room to each floor.

The embodiment of these and some other points necessitated the erection of an independent building, to

be connected with the general structure by a three-story corridor, and the surmounting of discrepancies of floor levels by stair flights.

To the design of such a building Dr. Bancroft devoted much serious study. Preliminary sketches were made, revised, and considered; to be redrawn with modifications again and again, until, at length, they were reduced to the permanent plans in accordance with which the present Kent building was afterwards erected. Some twenty-three years of uninterrupted occupancy have demonstrated the wisdom embodied in its design.

As originally constructed, the asylum kitchen was a low and imperfectly lighted room of insufficient size, on the front side and in the basement of the administration building. It was reached from the main hall by a stairway, near the front door. The chapel occupied a portion of the attic of the same building. Its dimensions were contracted, it was lighted by a single window, and its accessibility was difficult. The introduction of radiators had well nigh spoiled the basement as a repository of food supplies. In short, in 1868, the institution with two hundred and thirty-five patients in its halls was found to be without a proper chapel, dining-room for its employés, kitchen, and cellar.

It was evident that room for these could not be found within the then existing buildings of the institution. For the design and location of the commodious building which now accommodates them all, the asylum is also mainly indebted to the superintendent.

The proposition is a self-evident one, that an institution for the insane requires an abundant supply of pure water. This fact has never been forgotten by the trustees of the asylum. As early as 1843, the next year

after its opening, the superintendent reports to the trustees a daily supply of about twenty-five barrels from a "defective aqueduct," besides such additional amount as might be needed from a well. This, of course, was very soon found inadequate, and a dam was constructed across Bow brook, in the rear of and in close proximity to the asylum. The asylum pond of some half a dozen acres was the result. Somewhat later a spring was opened near by which supplied the drinking and cooking water of the institution. These superseded the aqueduct and well, and upon these the asylum depended for its water until 1880.

As the family increased in numbers this spring became unable to meet the enlarged demands upon it, and the question of a larger supply of potable water was earnestly discussed. Dr. Bancroft finally concluded to sink a well in close proximity to it, into which should be collected its water and that of all other springs centering at that point; its supply to be supplemented, if necessary, by filtered water from the pond.

In accordance with this decision, a well fifteen feet in depth and fifty feet in diameter was sunk through various strata of sand, clay, and gravel. This was walled up with heavy split stone, and covered with a permanent circular building of brick walls and a slated roof.

The supply of water thus obtained has proved abundant. Upon this well is made a daily draft of about seventy thousand gallons. Except when thus temporarily reduced, its water maintains a uniform depth of about nine feet, at which point it stands in equilibrium with its sources of supply. Neither drought nor rainfall effect its level. Upon this well many parts of the institution depend entirely for their water.

For many years demands had been made upon the asylum for the special care of individual patients which it was unprepared to meet. As a consequence, such either remained at home or were sent to institutions without the State. It was with regret that the superintendent was obliged to say to the friends of such that the institution was not organized to afford the treatment sought.

He painfully revolved this fact in his mind for years. He repeatedly called to it the attention of the trustees. The desirableness of such a building as would meet this want was freely acknowledged, but the lack of about thirty-five thousand dollars stood in the way of its erection. At length, however, the earnest desire of the superintendent, and their own convictions of duty constrained the trustees, in the absence of any hope of an appropriation by the Legislature, to ask of that honorable body the privilege of borrowing, for this purpose, on the asylum's credit, the sum of twenty thousand dollars. This request was granted, and the erection of the building was at once commenced. This sum proving insufficient, was subsequently increased by a state appropriation of ten thousand dollars, and a farther one by the trustees from the income of the permanent funds. These sufficed for its completion. In consideration of the devoted earnestness with which Dr. Bancroft had sought its erection, and of the many ideas largely original and peculiarly his own which he had embodied in it, the trustees attached to it his name, and called it the Bancroft building.

At the time of its erection this building had few if any equals, and no superiors on this line of asylum work. It permits a flexibility of treatment which is impossible in an ordinary asylum ward. It surrounds its inmates

with all the attractions of home. Pleasant and well furnished apartments, special attendance, the least possible interference with personal liberty, seclusion or society as may be deemed most desirable, are all made active in promoting their welfare.

But Dr. Bancroft did not confine his activity to the indoor work of the asylum. He had also under his control its grounds and farm, which embrace an area of nearly two hundred acres. He frequently sought recreation in studying the capabilities of these to afford adjuncts to the remedial agencies of the house. He possessed a natural love for landscape gardening and for farming. The high success of the efforts made for the improvement of the land belonging to the institution is due in no small measure to his good taste and skill.

Thus far, little has been said of Dr. Bancroft's strictly professional work, of his knowledge of mental disease in all its various phases, or of his skill in efforts for its removal. The annual reports of the institution afford the best record of these. The gradual enlargement and conversion of the old asylum buildings, embarrassingly faulty with the errors of their age, into the commodious edifice of to-day, attest not only a clear knowledge of structural wants, but a marked ability to meet them.

It is easy for any one who has been long conversant with Dr. Bancroft and his work, to read in these very important changes and additions his own gradual advance in the learning and requirements of his specialty. In these he has written an autobiography covering the best years of his life.

But absorbed as was Dr. Bancroft in his professional work, he, like most busy men, occasionally found time for other employment. He identified himself with the interests of the city of his adoption. For nine years he

rendered valuable service as a member of its Board of Education. For eight years he occupied the responsible position of a member of the standing committee of the trustees of the New Hampshire Savings Bank. For twenty-four years he was a trustee of the Rolfe and Rumford Asylum. He was, from time to time, called to testify, as an expert, in cases where mental soundness was in question. For three years he was a lecturer on mental disease in the Dartmouth Medical School, at Hanover. He was a member of the New Hampshire Medical Society, of the National Association of Medical Superintendents of Asylums; and at the time of the first attack of the malady which caused his death, he was, as President, addressing the members of the New England Psychological Society then in session at Boston. The papers which he has read at meetings of his professional brethren have been valuable. Some of these have been published and their circulation has contributed to his reputation as an alienist both in this country and in Europe.

Dr. Bancroft kept himself well informed of the progress of current events, and was always in hearty sympathy with all such as tended to ameliorate the condition of his fellow men. While he was never a politician, and never, during his residence in New Hampshire, held a political office, or was influenced in the selection of an asylum employé by the political views of the applicant, he held decided opinions upon the administrative policies of our state and general governments. While he never obtruded these upon any one, he never sought to conceal them.

A similar remark applies to his religious convictions, which were well defined and positive. While in arriving at these, he was largely self reliant, and “Nullius

addictus jurare in verba magistri," he entertained the highest respect for those of others, unaccordant with his own. He based his views upon those of no particular time, school, or church. They grew, rather, from a careful consideration of the great fundamental principles enunciated in the Holy Scriptures. He was for many years a member of the Congregational church and died in its communion.

Every good and generous work had his sympathy, and, as far as practicable, his support. He labored long and earnestly that the pauper insane of New Hampshire might become the wards of the State. Few things ever gratified him more than the enactment by the Legislature of the law which made them such.

Dr. Bancroft was a diligent man, and, without seeming such, was always a student, not of books merely and in his study, but every where he went as well. On his daily rounds among his patients, on the asylum farm, in the meetings of the trustees, and in those of his medical associates, as also in his successive journeyings abroad, he was constantly gathering important facts, to be subsequently pondered and, so far as might be, reduced to generalizations.

As one reviews the life of Dr. Bancroft, it is by no means difficult to see what made him the man he was.

1. He came of good old New England stock. His character was largely determined by his ancestors, generations before he was born.

2. He had in early life the advantages of a good education, which he diligently supplemented by subsequent study, experience, and reflection! From these came, in part, the ability which he brought into use in his daily work.

3. He was by nature a broad man and progressive.

His mind was ever open to the reception of new ideas, which, having carefully revolved, he accepted or rejected as his reason dictated. He was little swayed by prejudice, but was candid in the examination of any subject. He always sought truth and was ever loyal to it when he had found it.

4. His moral tone was elevated. He was a conscientious man. Long association with him has proved that he was an honest one. He was not swayed by policy. "He would not flatter Neptune for his trident, nor Jove for his power to thunder."

5. He was a fine-grained man, of acute sensibilities, and often able to discern in others obscure qualities which might escape the observation of a person less delicately organized. This characteristic was of great value to him in his professional work.

6. He was, too, a gentleman in every fibre of his composition, and a gentleman of lofty type. He was not the mere product of artificial culture. While he may have owed much to the attrition of society, and to extensive mingling with equals and superiors, the most attractive qualities of his character were inborn. Affability and delicacy, integrity, patience, and sweetness were so interwoven with every feature of his mental composition that they became parts of it.

7. But ever accompanying all these, and of inestimable value in guiding them, was a broad and intelligent common sense. This he possessed in large measure, and it was mainly the gift of God. To this is to be largely attributed that mental equipoise which he was never without, and which enabled him to weigh, as in a balance, different points in the consideration of a subject, and reach conclusions which time and experience were most likely to sustain as true ones.

Dr. Bancroft served well his day and generation. The record of his life is an inspiration for good and pervades the longest chapter in the history of the asylum. New Hampshire owes him a debt of gratitude for his devoted ministrations to the welfare of her insane. The State is the better for his having lived in it.

The day of his obsequies was a beautiful one. The fresh grass, the half expanded leaves of the trees, and the returning birds proclaimed an early spring. The renaissance of nature was quietly declaring the great fact of human immortality.

A score or two of friends stood with bowed heads around his casket as it rested temporarily upon one of the highest elevations of the cemetery. Just below, the broad Merrimack swept quietly by on its journey from the mountains to the sea. A midday silence rested like a benediction upon all around, and a peace, like unto the peace of God which passeth all understanding, softened the sorrow of aching hearts. As careful hands lowered to its resting place his insensible dust, the bright sun, moving in majesty above, lighted the portal of his future, and reminded all that Jesse Parker Bancroft had risen to the scenes and employments of a higher life.

TRAINING SCHOOL.

The training school for nurses which was instituted about three years ago continues its important work. It graduated in June last a class of seven, to whom was awarded the diploma of the institution. The two classes now pursuing its course of instruction number eighteen.

Thus far all its students have been female attendants, but it is to be hoped that a representation from the male

side of the house may be inclined to avail themselves of the advantages which it offers them. The instruction has been mostly given by the officers of the asylum, supplemented, as far as necessary, by lectures kindly and gratuitously given by physicians and surgeons of the city.

This agency, although a new and simple one, has done much to enhance the value of the services of such of our nurses as have attended its recitations and lectures, resulting in better service and increased compensation. It has also resulted in raising their occupation to a higher plane, and in elevating the attendant service of the asylum.

THE NEW PIGGERY.

Some three years ago, a fatal malady invaded the asylum piggery, and destroyed the larger part of its inmates. It was as unexpected as it was destructive. Much inconvenience was the result. The proper disposal of the broken food of a family of over four hundred individuals became a matter of no little embarrassment, in as much as it was deemed unwise to restock the old pens, which, having been in use for a long time, might still be harboring the very germs which had caused the recent mortality.

After careful deliberation, it was deemed best to remove entirely the pens from the barn cellar, which they had hitherto occupied; and after proper cleansing, convert this space to purposes to which it was better adapted. It was also concluded to erect a new piggery, to be isolated from all other buildings, and constructed as far as might be of non-absorbent materials, in accordance with the best plan which could be procured. It so happened that the managers of the Brattleboro'

Asylum for the Insane had recently been giving special study to the same subject, and had embodied in the design of such a structure extensive theoretical and practical knowledge of its requirements. A piggery erected in accordance therewith had proved admirable in every particular. A committee of our Board visited that institution, and by a thorough inspection of it, became convinced that no better one could be designed to meet the necessities of this asylum.

With characteristic generosity, the trustees and superintendent of that institution most kindly placed at our disposal the plans and elevations which they had so carefully and intelligently elaborated.

The features of these have been adopted in almost every particular, and, during the past summer, there has been constructed in accordance therewith, a one story brick building two hundred feet long and thirty-seven and a half feet wide, with a head house at the east end of the same, forty and a half feet long and twenty-five and a half feet wide, containing a boiler room on one side and a slaughtering room on the other side of a passage way ten feet wide, extending through the entire length of both structures. The brick side walls of the piggery are six feet high, resting upon trench walls of granite. Upon these stand windows which occupy their entire length, reaching to the plates above. Two thirds of these may be kept open or shut at will, thus ensuring perfect ventilation during the warmer periods of the year. Winter ventilation is had by air shafts through the roof. The roof is of wood, and slopes from a single ridge line to the eaves. The pens are of brick supported by trench walls; the floors are of cement resting upon a sub-floor of cobble stones; and the feeding troughs are of iron. Every part of each



WALKER SUMMER COTTAGE.

pen is accessible to the broom and water hose. The floor of the attic story affords abundant room for the storage of bedding for the swine. Iron pipes conduct water to all parts of the building. A few of the pens, designed for breeding purposes, may be warmed, if at any time it be found desirable.

This piggery contains forty light and airy pens sufficient for the accommodation of from two hundred to two hundred and fifty swine. Its construction, which has been thorough, secures ample space, abundant light, ease of cleansing, convenience of feeding, and, so far as imperviousness of material can insure it, security against the lodgment of germ formations.

It is now being stocked with a new supply of swine, and out of doors airing yards are being inclosed as fast as needed. That it will prove an important adjunct to the agricultural equipment of the asylum there can be no doubt.

THE SUMMER COTTAGE.

Not long since, the asylum purchased about twenty acres of land, including a neighboring island, on the west shore of Penacook lake, in Concord, and distant about three miles from the asylum. The tract has a long shore line, and rises by a moderate ascent some sixty feet above the lake; while the land lying westward of it ascends some seventy-five or a hundred more, thereby affording to our estate an effective shelter from the cold northwest winds.

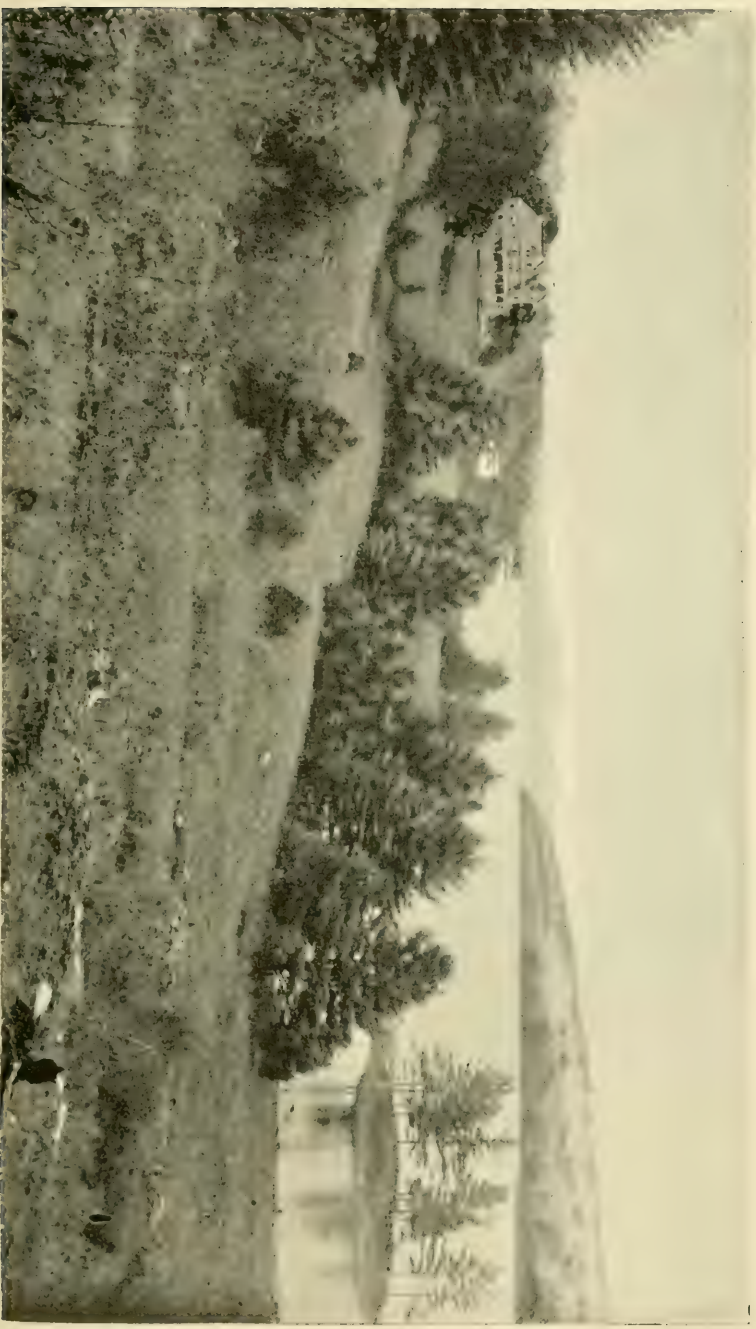
A part of this tract is in pasture, a small portion of it in forest, and the remainder is in grass. A brook of clear water flows through the northerly section of it, and supplements, if necessary, the water supply afforded by a windmill. A spring also, conveniently situated,

affords the purest of water, when wanted, for domestic uses.

Upon a little plateau of this field, about thirty feet above the lake, commanding an unobstructed view of its entire surface, of the farms which slope downwards to its eastern shore, as well as of the mountains which form the horizon's rim on the north, east, and south, a commodious cottage was erected last year, capable of accommodating a family of twenty patients, besides the necessary housekeeper and attendants. It was substantially finished in December, and was furnished during the last winter and spring.

A family of patients took up their abode there on the first day of last June, and remained there, with changes of membership, until the thirtieth day of last October. The benefits received by those who have sojourned there have been marked. The change of scene and the rural charms of the surrounding country, as well as the pure air and free range through pastures and fields, to which so many of our patients have been early accustomed, have certainly wrought a good work. Could the value of this be estimated in money, it would, we doubt not, be found to surpass in amount, during this single season, that of the entire investment of some seven thousand dollars.

While the usefulness of this cottage has never been considered uncertain, the summer's experience has conclusively demonstrated the importance of another for male patients, to be erected near by, and as soon as the means at the asylum's command will warrant the undertaking.



WALKER SUMMER COTTAGE AND LAKE PENACOOK.

IMPROVEMENT OF GROUNDS.

In 1872 a plan for the improvement of the asylum grounds was prepared by Mr. J. Weidenman, a landscape gardener of high ability, and adopted by the trustees. It embraced their entire area of about one hundred and twenty-five acres and gave in detail their proposed drainage, their various avenues and paths, together with hints for the planting of trees and shrubs.

Its execution, commenced soon after its adoption, has been prosecuted from time to time and as rapidly as the means at the disposal of the institution have allowed. The drainage of the oak grove in front of the house was the first of the contemplated work to be completed. It was thoroughly done by two-inch sole drain-tiles, laid with great care below frost, and centering at an ample basin constructed of brick at a point near the asylum's eastern boundary. From this the water is conducted by a larger drain through an adjoining estate to the city sewer, in Spring street, whence it flows to Merrimack river. The right of passage through this estate was purchased during the work's progress, and is a perpetual one.

By the under drainage of this section, the grand old oaks, a century old probably, have taken a new lease of life, and the ground beneath them has been rendered dry at all seasons of the year. Its position in the immediate front of the asylum, its nearness to Pleasant street, and its convenience of access to the patients have always made this the most important section of the asylum demesne. It is now the most charming.

All the walks and avenues delineated on the plan above mentioned have been completed. Where necessary, eminences have been lowered and low places

raised. Many trees and shrubs have also been planted. In addition to the avenues originally adopted, about one half of a belt carriage road, which is to skirt the borders of the entire estate, has been completed. It diverges from the avenue passing through the oaks, and is to connect with that passing round the pond.

On account of their large area and variety of surface, as well as their embellishment with trees and shrubs and flowers, the asylum grounds now afford a park, not only of great beauty, but of great utility as a curative agent in the treatment of patients committed to its care. Viewed from this standpoint, its value far transcends its entire cost and expense of maintenance.

PROSPECTIVE WANTS.

An examination of the reports of the asylum, beginning with that of 1843, which gives the operations of its first whole year, shows that the increase in the number of patients has been constant from decade to decade, and generally from year to year. It also shows that this increase has been accommodated by repeated enlargements of the asylum structure, no less than ten in number, whereby its original accommodations for ninety-six patients have been quadrupled.

Having, therefore, at the date of this report no less than three hundred and seventy under treatment, its present limit has again been nearly reached. A few years at most will suffice to attain it. The trustees, therefore, feel constrained to call your attention to this important fact, and to ask your early consideration of measures to meet its early requirements.

Inasmuch as both sides of the house will be likely to become full at substantially the same time, or thereabouts, the relief sought cannot be attained by the

enlargement of one side only. It has been suggested, and perhaps wisely, that, instead of enlarging our present structure, it would be better to erect a new one, to be disconnected from any part of the asylum, but located in its near neighborhood. That this consist of a centre administration building, flanked by two wings capable of accommodating an hundred patients, or thereabouts. It has also been suggested that it be so planned as to meet the requirements of those classes of patients most likely to disturb the peace of the general household. But no design has yet been matured, nor has a settled policy even, as a basis of such, been arrived at. The subject is brought to your attention at this time as an important one, and of it we respectfully ask your careful consideration.

But a more urgent need than this is that of a building capable of accommodating about twenty patients of characters similar to those for whom the Bancroft building was erected. Our experience with the latter has been such as to emphasize the importance of a like building for male patients.

Such an one would permit a wider range of treatment than the general asylum will allow, and would afford conveniences of which we are not now possessed on the male side of the house. At present, we are not prepared to answer, as we would like to do, calls for the special treatment of male patients requiring extra room and more than the usual attention. The Bancroft building was organized for such specific work, and the equipment of the asylum will be incomplete until we have its counterpart in a similar structure for the accommodation of men.

The usual table of farm statistics accompanies this report. It is not only interesting as giving a creditable

list of agricultural productions, but as showing the financial importance to an institution like this of a well conducted farm, upon which its waste materials can be utilized, and food products raised at prices considerably below those for which they could be purchased in the market. With the exception of a limited amount of hay, the asylum consumes the annual products of its farm.

During the last year, in addition to the pig pen, a silo has been partially constructed, a large and commodious vegetable cellar has been fitted up under the barn, and an important addition made to the tool-house.

GEORGE B. TWITCHELL,
DEXTER RICHARDS,
WILLIAM G. PERRY,
C. P. FROST,
FRANKLIN D. AYER,
J. E. BARRY,
ELLERY A. HIBBARD,
WATERMAN SMITH,
MORRIS CHRISTIE,
EDWARD SPALDING,
WM. H. H. MASON,
J. B. WALKER,

Trustees.

CONCORD, N. H., November 19, 1891.

REPORT OF THE SUPERINTENDENT.

The Superintendent respectfully submits the forty-ninth annual report of the Asylum for the year ending September 30, 1891.

The year commenced with three hundred and sixty-four patients — one hundred and seventy-four men, and one hundred and ninety women.

The number admitted during the year was one hundred and seventy-three — eighty-six men, and eighty-seven women.

The number of different persons under treatment during the year was five hundred and twenty-seven — two hundred and fifty-seven men, and two hundred and seventy women.

The mortality rate for the year was 7.4 per cent. The general health of the house has been excellent, no acute infectious or contagious disease having made its appearance. Nearly all deaths resulted from organic disease of the brain or other organs not admitting of any other termination.

The percentage of recoveries, based upon the number of cases admitted, and excluding all recoveries from alcohol or opium habit is 24.28 per cent.

One woman was discharged as recovered from the opium habit, and three men as recovered from alcoholism.

Forty patients have been discharged in such varying

degrees of improvement as would admit of their remaining at home or with friends. Many of these "improved" cases have become in whole or in part self-sustaining. Every year witnesses a number of discharges of this class. And in estimating the usefulness of a hospital for the insane, not only must the actual recoveries that are secured be considered, but due regard should also be entertained for this very large class that are yearly restored to their relatives and friends in comfortable mental condition, and not infrequently capable of a certain degree of self-support.

Out of the entire population under treatment during the year, sixty-five have manifested the suicidal propensity. Fortunately this accident has not occurred.

The percentage of recovery is necessarily low when it is considered how small a proportion of those admitted during the year belong to the curable class. Many of those cases that were thought to be curable at the time of admission prove upon further study to be incurable. Many who bring patients fail to give a clear history of the case. Frequently a few weeks are given as the probable duration of the insanity, when really the mental disturbance began several months before, and not unfrequently a period of between one and two years has elapsed since the inception of the malady. Then, too, the hereditary tendency is so misrepresented that a patient is frequently supposed upon admission to have had healthy antecedents when just the reverse is the case. Consequently, it happens that many whose prognosis is considered as favorable at the time of admission, come to be regarded as incurable at the end of the year. Thus in Table XXIII, out of the one hundred and seventy-three admissions during the year, ninety-seven were supposed to be curable; but at the end of the

year, out of the three hundred and seventy-two patients remaining in the asylum, only forty-seven can be fairly said to have curable prospects.

The early recognition of insanity is a matter of the utmost importance. The general practitioner too frequently fails to recognize the fact that his patient is on the verge of alienation. It is not by any means necessary that every case at the beginning of mental disturbance should be hurried away to an asylum, but it is desirable that the psychosis should be recognized at its first appearance, and the proper course of treatment pursued. Some cases by judicious management, removal of exciting causes, and proper medical treatment can be safely carried through an attack of alienation outside an asylum. Other cases, and these constitute the majority, require hospital restraint, supervision, and treatment, and it is of the utmost importance that removal to the asylum should be made at as early a date as possible, before morbid ideas have become fixed, and mental deterioration established. Were these cases recognized and committed earlier, their recovery would be more certain.

In the last report allusion was made to the passage of a new lunacy law in this State, and the establishment of a commission of lunacy, provided with power to carry the new law into effect. It is not necessary to repeat again what was said at that time. The recognition by the State of the grave character of insanity, of the utter helplessness of the insane poor, of the dependence of those afflicted with this most terrible of human ailments upon another's guidance, render the passage of the law recognizing State supervision of the insane poor a most important legislative act. That many indigent insane throughout the State have already been benefited by

this charitable legislation the report of the commissioners of lunacy will show.

Two important amendments to the general act as passed in 1889 take effect on Jan. 1, 1892. On that day the board of lunacy will have the power to commit to the asylum any worthy indigent insane person in the State that needs special care and treatment; they will also have the power to discharge any patient from the asylum. This extension of the power of committal to worthy poor insane patients will enable many to receive the benefit of State assistance at a time when it is most needed. Otherwise these unfortunate persons would be forced to become town or county paupers before they could receive any aid or medical care. Previous experience has demonstrated the fact that many poor people will linger at home improperly cared for and without proper treatment rather than throw themselves upon the charity of the town or county.

The power of discharge that will be conferred upon the board of lunacy at the beginning of the new year is a wise measure. The responsibility of discharge of patients from the asylum is a duty at times both delicate and onerous. The sharing of this responsibility, and frequently its entire assumption, by a commission wholly independent of the asylum management will materially relieve the latter.

The new law recognizes the fact, that our state asylum is a remedial institution. It seems scarcely necessary, therefore, to repeat, what has frequently appeared in previous reports, that this institution should be fully provided with every facility for the proper care and treatment of mental and nervous disease. Every appliance for the treatment of these diseases should be called into requisition by any institution that would keep

abreast of the times, and fulfill the requirements of a well appointed hospital. Proper buildings for classification are of the first importance, so that patients in the different stages of mental disease may not come in contact with each other. It was in this connection that the desirability of a summer cottage for convalescent patients at Lake Penacook was recommended to your attention in the last report. Your very generous and prompt response has enabled the management to complete the attractive building, a view of which appears in the present report. At the annual meeting of the board, held at the cottage last May, it was very appropriately decided to name the new building the Walker Summer Cottage, in honor of Hon. J. B. Walker, for so many years the secretary of your board.

The Walker Summer Cottage was finished last April. At that time all the plumbing was completed, and an abundance of pure water provided by the erection of a fourteen feet Eclipse windmill, together with a tank having a capacity of 2,300 gallons. Connection was also made on high ground with the little brook which runs through the estate, and which provides an ample supply for the lawns, and serves as a reserve for the house in cases of accident to the windmill or dearth of wind.

The cottage was occupied on the first day of June by a party of sixteen women of the convalescent class. During the entire season there was a daily average of seventeen patients. It is not necessary for me to say that this, the first year of its existence, has demonstrated the usefulness of this important adjunct to the remedial agencies possessed by the institution. The quiet, the freedom from all restraint, the opportunities for enjoying open air and sunshine, and the charming natural

scenery of the locality all contribute to restore those whose nervous systems are weakened by physical disease or other causes.

During the entire season many patients have driven up for the day, taking dinner with the family, enjoying an hour or two on the broad piazzas, or picking berries on the grounds, of which there was an abundance. These day parties have proved very serviceable for many who were not well enough to spend the entire time at the cottage. Several patients have convalesced and have been discharged from the place, and nearly all have expressed in one way or another their enjoyment and appreciation of the change.

On the first day of September the women returned, not without regret, to the asylum, and a party of seventeen men took their place. Among the men were many who were capable of working on the grounds. With their assistance the wet wooded land west of the house has been underdrained and graded, and a delightful shady grove thereby secured. On the sloping ground in front of the cottage the rough stones and large boulders have been removed, a substantial causeway to the island completed, and a stable and steamboat landing constructed. In one sheltered corner in the grounds the land was ploughed, cleared of stones and low bushes, and planted with potatoes. Seventy bushels were raised, more than enough to supply the family after the first of August. This same ground, after the removal of the potatoes, was reploughed and fertilized, and will be planted with early apples and small fruits in the following spring. In all these enterprises many of the men have taken an interested part. All who were placed in charge at the cottage contributed by their interest and efficiency to make this its first year a success.

To return to the needs of the asylum, it is necessary to again call attention to the pressing demand for a detached building for convalescent male patients. This building is essential to a proper treatment of many of the cases committed to the care of the asylum. Such a house need not accommodate more than eighteen to twenty-four men, and when fully equipped and furnished ought not to cost more than \$25,000. A building of this character, placed in the charge of a competent man and his wife and a good nurse would at the present time be of inestimable value to the institution. It would enable us to properly locate a very important class of patients, and to bring together in pleasant family relationship those that mentally and socially require just such a classification. I trust that this matter will merit your serious attention at the present meeting, and that such steps will be taken as will lead to its ultimate realization.

TRAINING SCHOOL FOR NURSES.

The second class in the training school, seven in number, graduated last spring. The experience of another year tends to confirm the anticipations that were entertained as to the value of systematic training of those that care for the insane. The training develops an interest and awakens an intelligence in the nurse that the mere routine work of the asylum service without such instruction rarely effects.

Not only is the asylum benefited by having trained and intelligent nurses for its patients, but the general public are also benefited in that many of these nurses after graduation become available for general nursing outside the institution. Of the eighteen women who have graduated from the school since its establishment,

nine have entered into general nursing, while six remain in the service of the institution. Of the nine that have engaged in general nursing, many have done great credit to themselves as well as the school that sent them out. The following unsolicited testimonial of the services of two of this number is evidence that the school has not labored in vain, and that its good work is already appreciated: "They have been untiring in their labor, and so cheerful, quiet, and efficient in every service that I wish to be testimony in their behalf. The training school that sends out such nurses is a public benefactor."

It is proposed during the coming year to set apart one special room in the basement for a diet kitchen, provided with all the necessities for cooking special diets for the sick. In this diet kitchen will be held the regular course of instruction for sick room cookery as given by the Boston Cooking School. After such instruction has been given, each nurse will be given opportunity to prepare broths, gruels, and every variety of special diet for the sick.

The requirements for admission to the school, the general course of study pursued, and other information is now published in a circular which is sent to all applicants desiring admission to the school. This circular is published in the appendix of the present report.

PERMANENT IMPROVEMENTS.

In the previous report allusion was made to the need of new plumbing in the Peaslee wing. During the past winter the public wash-rooms leading from the three main wards of the building were entirely torn out and the plumbing renewed. Tile floors, new wash-bowls, urinals with automatic flushing apparatus, water-

closets with seat flushing mechanism, and brass piping were introduced. The private bath and wash-rooms in the corridor of the same building were similarly renewed, and a brick division wall erected from the basement to the attic in order to more completely separate the private from the general wash-rooms. The expenditure required by so radical a renewal of floors, walls, ceiling, and fixtures was necessarily large, but the need for a renewal was imperative, and experience has demonstrated that only the latest and best plumbing devices, which are also the most expensive, are desirable.

For the past few years the increased productiveness of the farm, and the large addition to the house population have furnished an annual reminder that the barn and the farm buildings were not nearly adequate to the demands both of the farm and house. In the first place, there was not sufficient room for the storage of crops, and for the housing of farm implements; and secondly, there was no room for an increase in the number of cows, an increase that has become imperative because of the additional demand for milk to meet the demands of the larger house population.

While the need of additional farm buildings had been recognized during the past few years, an epidemic of hog cholera in the summer of 1888 rendered a change of some sort imperative. These animals for many years had been located in the barn cellar. The place in some way became infected with the germs of this fatal disease, and within three or four weeks from its first appearance nearly seventy hogs, large and small, succumbed.

It became evident therefore that radical changes were necessary. A little reflection rendered it apparent that

the hogs should be removed to an independent building with better hygienic and sanitary conditions, and that the large space, rendered vacant in the barn cellar by their removal, be converted into a vegetable cellar. Moreover, that the barn itself should be extended thirty feet, the tool house extended so as to admit of the proper housing of farm wagons, and that two silos should be constructed in the barn. So many and comprehensive changes necessitated a legislative appropriation, and upon petition to the Legislature of 1890, an appropriation of \$8,000 was granted.

Work was begun early in the spring. The cellar under the barn has been converted into an admirable storehouse for vegetables by the erection of a fourteen-inch brick wall, thereby separating the larger part of this cellar from the space under the cows. The tool house has been extended forty-two feet and a large repository for farm teams, sleds, and implements secured. And lastly an entirely new building for hogs was erected, including a slaughter-house, and room for cooking feed with a boiler.

During the ensuing year it will remain to extend the barn thirty feet with cellar, to complete the silos, to re-shingle the old barn, and to make certain alterations in the stalls for farm horses. In making these changes it will be also desirable to place permanent drinking troughs in front of the cows, and to locate a continuous row of sliding windows on the south side of the barn in rear of the cows, thereby admitting an abundance of fresh air and sunlight.

The position of head farmer, made vacant a year ago, has been acceptably filled by Mr. R. S. Alden, a graduate of the State Agricultural school. His report of the crops raised during the past year will be found

in another place. A shrinkage in the amount of fertilizing material caused by the sudden removal of so many hogs from the stock of farm animals necessarily made itself felt in the yield of the farm crops. During another year the farm will surely receive great benefit from additional fertilizers derived from increase in the numbers of stock.

During the summer months while the patients were at the Walker cottage many rooms were painted and renovated in the lower ward of the Bancroft building and in No. 6. In the latter place several steel ceilings were put in place of the old lath and plaster ceilings. Their appearance is such that in the future it would seem quite desirable that whenever old ceilings need renewal they be replaced by the metallic ceilings.

The work of improving the grounds, and of completing the border avenue, and filling in the low land along the brook has progressed as time and means at command would admit.

ACKNOWLEDGMENTS.

To all faithful and efficient employés the superintendent wishes to express his gratitude.

The following papers throughout the State have been gratuitously supplied the asylum during the past year:

“Granite State News,” “Manchester Weekly Union,” “People and Patriot,” “Concord Daily Monitor,” “Nashua Gazette,” “The Farmer’s Cabinet,” “Berlin Independent,” “The Morning Star,” “The New Hampshire Gazette,” “The Mountaineer,” “Cheshire Republican,” “Sandwich Reporter,” “The Analecta,” “The Belknap Republican,” “Carroll County Pioneer,” “Manchester Weekly Budget,” “Exeter Gazette,” “The Derry News,” “The Merri-

mack Journal," "The Great Falls Free Press," "The Weekly Times," "Peterboro' Transcript," "The States and Union," "The Northern Herald."

During the past year systematic and careful ophthalmological examinations have been made by Dr. A. C. Nason of many patients throughout the asylum. To facilitate the work a special room has been set apart for this purpose. It is proposed to continue these examinations in the future, and to publish the results. Following the statistical tables will be found Dr. Nason's report of work done this year. Much credit is due to Dr. Nason for his interest and enthusiastic work in this direction, and we are especially indebted to Dr. Thomas Hiland for assistance and consultation in the ophthalmological clinic.

During the summer months the Lake Penacook Steamboat Co., through their manager, Mr. Adam Holden, gave many patients at the Walker cottage gratuitous rides upon the lake; for this, and many other favors, the superintendent wishes to express his appreciation, and extend not only his own but the thanks of many patients who enjoyed these attentions.

Especial acknowledgment is again due Dr. Julia Wallace Russell and Dr. Charles R. Walker for their continued assistance in the lectures of the training school.

Leave of absence having been granted Dr. Edward French for several months, his place of first assistant physician has been filled by the promotion of Dr. A. C. Nason. Dr. Nason's position has been taken by Dr. A. D. Reagan, recently graduated from Long Island College Hospital.

On the thirtieth day of April last my revered father, Dr. J. P. Bancroft, for twenty-five years the superin-

tendent of this institution, and for thirty-three years its treasurer, passed from our midst. I may be pardoned for referring with especial tenderness to the mutual loss sustained by us in his death. A good manager, an able financier, a thorough student in psychological science, he brought the institution up from small beginnings to be one of the best in the land. Indefatigable in working for the cause to which he had devoted his life, he had the satisfaction of seeing state supervision of the insane poor in New Hampshire become an established law. Eminently practical and a judicious advisor, his long and valued experience will be greatly missed by us. Personally he endeared himself to all with whom he came in contact. His sympathetic and kindly presence greatly endeared him to his patients, and his death brings a loss not easily replaced. Happily, the good influences of his work in this institution will long endure ; each year will witness the completion of some good work initiated by him, and it is to be hoped that the liberal and far-seeing policy established by him for the care and treatment of insanity may be perpetuated by his successors.

As in previous years the generous assistance rendered by your board has materially lightened the difficulties encountered by the superintendent, and is fully appreciated by him.

C. P. BANCROFT,
Superintendent.

CONCORD, N. H., September 30, 1891.

STATISTICAL TABLES.

TABLE I.

	Men.	Women.	Total.
Patients in the hospital October 1, 1890.....	174	190	364
Cases admitted during the year.....	86	87	173
Discharged within the year.....	73	92	165
Viz., as recovered from first attack.....	13	8	21
as recovered from other than first.....	8	13	21
as recovered from the opium habit.....	...	1	1
as recovered from alcoholism.....	3	...	3
as much improved.....	8	8	16
as improved.....	9	15	24
as not improved.....	17	20	37
as not insane.....	...	3	3
Eloped.....	1	...	1
Deaths.....	14	24	38
Patients remaining October 1, 1891.....	186	186	372
Number of different persons treated in the year....	257	270	527
Number of different persons admitted.....	83	83	166
Number of different persons recovered.....	22	20	42
Daily average number of persons.....	175.62	184.99	360.61

TABLE II.

Showing result in all under treatment during the year.

	Of those in the asylum at the beginning of the year.			Of those admit- ted during the year.			Total of both classes.		
	Men.	Women.	Total.	Men.	Women.	Total.	Men.	Women.	Total.
Discharged recovered..	4	9	13	17	12	29	21	21	42
" much improv'd	3	6	9	5	2	7	8	8	16
" improved.....	7	6	13	2	9	11	9	15	24
" not improved..	12	17	29	5	3	8	17	20	37
" alcoholism.....	...	...	...	3	...	3	3	...	3
" opium habit....	...	...	...	...	1	1	...	1	1
" not insane.....	...	1	1	...	2	2	...	3	3
" eloped.....	...	...	...	1	...	1	1	...	1
Died.....	9	20	29	5	4	9	14	24	38
Remaining improved..	12	21	33	17	26	43	29	47	76
" not improved	126	114	240	30	23	53	156	137	293
" not insane...	1	1	2	...	1	1	1	2	3

TABLE III.

Admissions and discharges from the beginning of the asylum.

	Men.	Women.	Total.
Admitted.....	2,966	2,808	5,774
Discharged.....	2,714	2,554	5,268
" recovered.....	1,017	980	1,997
" improved.....	654	666	1,320
" not improved.....	570	514	1,084
Died.....	518	446	964

TABLE IV.

Showing number and character of those recovered during the year.

	Cases in which recurrency is not established.			Cases in which recurrency is established.			Total of both classes.		
	Men.	Women.	Total.	Men.	Women.	Total.	Men.	Women.	Total.
From first attack.....	13	9	22	..	..	..	13	9	22
" second ".....	4	3	7	..	..	..	4	3	7
" third ".....	2	1	3	..	..	..	2	1	3
" fourth ".....	..	..	..	..	2	2	..	2	2
" fifth ".....	..	..	..	..	2	2	..	2	2
" sixth ".....	..	..	..	..	1	1	..	1	1
" seventh ".....	..	..	..	..	1	1	..	1	1
" ninth ".....	..	..	..	1	1	2	1	1	2
" 87th ".....	..	..	..	..	1	1	..	1	1
Unknown.....	..	..	..	1	..	..	1	..	1

TABLE V.

Showing duration of insanity before admission in those recovered during the year.

	Men.	Women.	Total.
Less than one month.....	9	6	15
One to three months.....	3	8	11
Three to four months.....	1	1	2
Six to twelve months.....	1	2	3
More than one year.....	4	3	7
Unknown.....	3	1	4
	21	21	42

TABLE VI.

Showing number of admissions to this asylum in those admitted during the year.

	Men.	Women.	Total.
Admitted the first time.....	67	60	127
“ second “	13	13	26
“ third “	4	2	6
“ fourth “	1	5	6
“ fifth “ .....	..	2	2
“ sixth “	1	1	2
“ seventh “ .....	..	2	2
“ ninth “ .....	..	2	2
	86	87	173

TABLE VII.

Showing number of the attack in those admitted during the year.

	Men.	Women.	Total.
First	68	47	115
Second	9	16	25
Third	3	5	8
Fourth	1	3	4
Fifth .....	..	2	2
Sixth .....	..	3	3
Seventh .....	..	3	3
Ninth	1	1	2
Eleventh .....	..	1	1
Twelfth .....	..	2	2
Opium habit .....	..	1	1
Not insane .....	..	2	2
Unknown	4	1	5
	86	87	173

TABLE VIII.

Showing duration of insanity in those admitted during the year.

	Men.	Women.	Total.
Less than one month.....	15	13	28
One to three months.....	9	15	24
Three to six months.....	12	7	19
Six to nine months.....	2	7	9
Nine to twelve months.....	3	2	5
Twelve to eighteen months.....	9	4	13
Eighteen months to two years.....	4	2	6
Two to three years.....	4	2	6
Three to four years.....	3	6	9
Five to ten years.....	8	6	14
Ten to fifteen years.....	1	2	3
Fifteen to twenty years.....	3	2	5
Twenty to thirty years.....	..	5	5
Thirty to forty years.....	2	..	2
Forty to fifty years.....	..	1	1
Alcoholism.....	..	..	..
Opium habit.....	..	1	1
Unknown.....	11	8	19
Not insane.....	..	4	4
	86	87	173

TABLE IX.

Showing ages of those admitted during the year.

	Men.	Women.	Total.
15 to 20 years.....	4	3	7
20 to 25 years.....	8	7	15
25 to 30 years.....	7	8	15
30 to 35 years.....	10	9	19
35 to 40 years.....	9	10	19
40 to 45 years.....	11	10	21
45 to 50 years.....	8	15	23
50 to 60 years.....	14	19	33
60 to 70 years.....	13	3	16
70 to 80 years.....	1	1	2
80 to 90 years.....	1	2	3
	86	87	173

TABLE X.

Showing form of disease in those admitted during the year.

	Men.	Women.	Total.
Acute mania.....	7	10	17
Sub-acute mania.....	22	10	32
Recurrent mania.....	2	12	14
Chronic mania.....	1	1	2
Circular mania.....	1	2	3
Epileptic mania.....	1	1	2
Acute melancholia.....	12	12	24
Sub-acute melancholia.....	7	13	20
Chronic melancholia.....	2	2	4
Puerperal melancholia.....	..	1	1
Recurrent melancholia.....	..	2	2
Melancholia with stupor.....	2	..	2
Chronic dementia.....	9	4	13
Senile dementia.....	4	1	5
Structural disease of the brain.....	2	1	3
Imbecility.....	..	3	3
Hypochondriasis.....	1	..	1
Hystero-mania.....	1	..	1
Dipsomania.....	1	..	1
Paresis.....	2	..	2
Adolescent insanity.....	..	1	1
Chronic delusional insanity.....	5	6	11
Alcoholism.....	4	..	4
Opium habit.....	..	1	1
Not insane.....	..	4	4
	86	87	173

TABLE XI.

Showing complications in those admitted during the year.

	Men.	Women.	Total.
Hereditary tendency to insanity.....	12	23	35
Intemperance.....	16	..	16
Epilepsy.....	3	3	6
Opium habit.....	2	1	3
Syphilis.....	3	..	3
Phthisis.....	..	2	2
Neuralgia.....	..	2	2
Uterine diseases.....	..	2	2
Dyspepsia.....	..	2	2
Malaria.....	1	..	1
Chorea.....	1	..	1
Lead poisoning.....	1	..	1
	39	35	74

TABLE XII.

Showing number with suicidal propensity under treatment during the year.

	Men.	Women.	Total.
Of those in the asylum at the beginning of the year.....	12	17	29
Of those admitted during the year.....	13	20	33
	25	37	62

TABLE XIII.

Showing civil condition of those admitted during the year.

	Men.	Women.	Total.
Single.....	33	33	66
Married.....	42	41	83
Widows.....	..	9	9
Widowers.....	11	..	11
Divorced.....	2	1	3
Unknown.....	..	1	1
	88	85	173

TABLE XIV.

Showing occupations of those admitted during the year.

	Men.	Women.	Total.
Housewives ... ..	..	51	51
Laborers.....	17	..	17
Farmers.....	16	..	16
Domestics.....	..	12	12
Mill operatives.....	7	4	11
Shoe operatives.....	6	..	6
Machinists.....	4	..	4
Carpenters.....	3	..	3
Painters.....	3	..	3
Teamsters.....	2	..	2
Stone cutters.....	2	..	2
Seamstresses.....	..	2	2
Wheelrights.....	2	..	2
Janitor.....	1	..	1
Cabinet-maker.....	1	..	1
Locomotive engineer.....	1	..	1
Governess.....	..	1	1
Fireman.....	1	..	1
Stone mason.....	1	..	1
Student.....	1	..	1
Saloon-keeper.....	1	..	1
Merchants.....	2	..	2
Metal-worker.....	1	..	1
Photographer.....	..	1	1
Clergyman.....	1	..	1
Lumberman.....	1	..	1
Blacksmith.....	1	..	1
Paper hanger.....	1	..	1
Teacher.....	..	1	1
Livery stable keeper.....	1	..	1
Jeweler.....	1	..	1
Clerk.....	..	1	1
Woodturner.....	1	..	1
Printer.....	1	..	1
Dressmakers.....	..	2	2
Type-setter.....	..	1	1
None.....	5	12	17
	86	87	173

TABLE XV.

Showing nativity of those admitted during the year.

	Men.	Women.	Total.
New Hampshire.....	50	65	115
Vermont.....	4	6	10
Massachusetts.....	3	4	7
Maine.....	4	4	8
Connecticut.....	..	1	1
New York.....	1	..	1
Pennsylvania.....	..	1	1
Wisconsin.....	1	..	1
Ireland.....	7	3	10
Canada.....	3	2	5
Scotland.....	3	..	3
Nova Scotia.....	2	..	2
England.....	1	..	1
Prince Edwards Island.....	1	..	1
France.....	1	..	1
Germany.....	1	..	1
Sweden.....	1	..	1
Unknown.....	3	1	4
	86	87	173

TABLE XVI.

Showing residence of those admitted during the year.

	Men.	Women.	Total.
Hillsborough county.....	20	25	45
Merrimack ".....	14	15	29
Cheshire ".....	11	10	21
Strafford ".....	13	7	20
Rockingham ".....	9	7	16
Grafton ".....	3	8	11
Coös ".....	3	5	8
Carroll ".....	4	1	5
Belknap ".....	3	2	5
Sullivan ".....	3	2	5
Massachusetts.....	1	3	4
Vermont.....	1	..	1
Maine.....	..	1	1
Canada.....	1	1	2
	86	87	173

TABLE XVII.

Showing by what authority committed.

	Men.	Women.	Total.
By friends.....	48	65	113
By state commissioners of lunacy ..	13	17	30
By counties.....	6	1	7
By towns.....	10	2	12
By courts.....	8	..	8
By self.....	..	2	2
By order of Governor.....	1	..	1
	86	87	173

TABLE XVIII.

Showing by whom supported.

	Men.	Women.	Total.
By self or friends.....	40	65	105
By counties.....	13	2	15
By towns.....	14	1	15
By State, including cases sent by supreme court, by order of the Governor, and by order of the state commissioners of lunacy.....	19	19	38
	86	87	173

TABLE XIX.

Deaths during the year and their causes.

	Men.	Women.	Total.
Structural disease of the brain.....	5	3	8
Exhaustion from chronic mania.....	1	2	3
“ “ acute mania.....	..	..	..
“ “ chronic melancholia.....	..	1	1
“ “ acute melancholia.....	1	1	2
“ “ chronic dementia.....	..	4	4
“ “ senile dementia.....	2	..	2
“ “ melancholia with stupor.....	1	..	1
Paresis.....	1	1	2
Phthisis pulmonalis.....	..	2	2
Apoplexy.....	..	2	2
Pneumonia.....	1	1	2
Senile gangrene.....	..	1	1
Cardiac dyspnea.....	..	1	1
Edema of lungs.....	1	..	1
Acute Bright's disease.....	..	1	1
Chronic alcoholism.....	1	..	1
Diarrhœa.....	..	..	..
Bronchitis.....	..	1	1
Round-celled sarcoma of the breast.....	..	1	1
Old age.....	..	2	2
	14	24	38

TABLE XX.

Showing ages at time of death.

	Men.	Women.	Total.
Between 20 and 30 years old.....	1	1	2
“ 30 “ 40 “ “.....	1	2	3
“ 40 “ 50 “ “.....	4	3	7
“ 50 “ 60 “ “.....	2	6	8
“ 60 “ 70 “ “.....	1	2	3
“ 70 “ 80 “ “.....	4	4	8
Over 80 years old.....	1	6	7
	14	24	38

TABLE XXI.

Showing ages of those remaining at the end of the year.

	Men.	Women.	Total.
Under 20 years of age.....	1	4	5
20 to 30 years old.....	25	11	36
30 “ 40 “ “.....	40	33	73
40 “ 50 “ “.....	44	51	95
50 “ 60 “ “.....	35	34	69
60 “ 70 “ “.....	21	32	53
70 “ 80 “ “.....	13	14	27
Over 80 “ “.....	7	7	14
	186	186	372

TABLE XXII.

Showing duration of disease in those remaining at the end of the year.

	Men.	Women.	Total.
From 1 to 2 months.....	4	2	6
“ 3 “ 6 “ “.....	7	6	13
“ 6 “ 12 “ “.....	7	8	15
“ 12 “ 18 “ “.....	7	7	14
“ 18 months to 2 years.....	9	1	10
“ 2 to 3 years.....	22	11	33
“ 3 “ 5 “ “.....	9	19	28
“ 5 “ 10 “ “.....	31	35	66
“ 10 “ 15 “ “.....	23	26	49
“ 15 “ 20 “ “.....	11	22	33
“ 20 “ 25 “ “.....	10	11	21
“ 25 “ 30 “ “.....	11	9	20
“ 30 “ 40 “ “.....	8	11	19
Over forty years.....	3	7	10
Unknown.....	23	9	32
Not insane.....	..	2	2
Opium habit.....	1	..	1
	186	186	372

TABLE XXIII.

Showing prospect of recovery in those admitted during the year.

	Men.	Women.	Total.
Curable (apparently).....	45	52	97
Incurable (apparently).....	36	31	67
Alcoholism.....	4	..	4
Opium habit.....	1	..	1
Not insane.....	..	4	4
	86	87	173

TABLE XXIV.

Prospects of those remaining at the end of the year.

	Men.	Women.	Total.
Curable (apparently).....	20	27	47
Incurable (apparently).....	164	157	321
Alcoholism.....	1	..	1
Opium habit.....	1	..	1
Not insane.....	..	2	2
	186	186	372

TABLE XXV.

Statistics of admissions, discharges, and deaths, from the opening of the asylum.

Year.	Admitted.	Discharged and died.	Recovered.	Improved.	Unimproved.	Died.	Whole number under treatment.	Remaining at end of hospital year.	Daily averages of the hospital.		
									Men.	Women.	Total.
1843	76	29	12	10	6	1	76	47	....	....	....
1844	104	81	37	20	19	5	151	70	....	....	....
1845	88	82	37	17	22	6	158	76	....	....	....
1846	98	76	26	23	16	11	174	98	....	....	....
1847	89	87	38	17	23	9	187	100	....	....	....
1848	92	83	29	20	26	8	192	100	....	....	....
1849	81	76	36	15	11	14	190	114	....	....	....
1850	103	90	45	18	20	7	217	127	....	....	....
1851	88	98	45	25	16	12	215	117	....	....	....
1852	107	106	66	13	16	11	224	118	....	....	....
1853	132	107	65	25	11	8	250	143	....	....	....
1854	141	123	63	24	22	14	284	161	....	....	....
1855	95	91	50	20	9	12	246	155	....	....	....
1856	85	96	66	13	7	10	250	154	....	....	....
1857	97	81	47	15	7	12	251	170	....	....	....
1858	76	77	34	20	5	18	246	169	....	....	....
1859	98	85	31	22	18	14	267	182	....	....	....
1860	85	83	38	16	12	17	267	184	94.0	88.0	182.0
1861	106	94	34	34	10	16	290	196	90.0	100.0	190.0
1862	86	94	42	32	7	13	282	188	88.7	105.7	191.4
1863	101	85	30	32	17	16	289	204	87.4	105.9	193.3
1864	105	92	36	16	17	23	309	217	99.4	107.4	206.8
1865	107	102	42	23	14	22	324	223	102.5	115.9	218.4
1866	104	91	26	28	16	21	327	236	106.3	122.6	228.9
1867	117	107	39	24	27	17	353	246	119.3	122.6	241.9
1868	118	129	51	39	18	21	364	235	118.5	121.27	239.77
1869	95	93	42	20	9	22	330	237	113.7	129.9	243.6
1870	130	114	37	34	20	23	367	253	123.1	125.9	249.0
1871	135	163	65	37	29	32	388	225	119.8	123.44	242.82
1872	152	123	55	31	16	21	377	254	109.36	125.19	234.55
1873	194	172	61	51	27	33	448	273	127.8	139.5	267.3
1874	140	137	42	44	27	22	416	281	140.4	127.5	267.9
1875	120	140	53	37	30	20	401	261	136.6	138.1	274.7
1876	140	122	35	34	27	26	401	279	121.4	139.1	260.5
1877	119	118	36	38	27	17	398	280	124.2	150.3	274.5
1878	114	118	35	36	30	17	394	276	128.9	143.8	272.7
1879	73	81	27	23	8	23	349	268	126.3	143.8	270.1
1880	111	94	28	27	22	17	379	285	127.4	147.6	275.0
1881	134	117	33	39	23	22	419	302	133.3	158.6	291.9
1882	104	121	38	26	27	30	406	285	131.0	159.1	290.1
1883	133	123	41	23	34	25	418	295	120.3	164.1	284.4
1884	141	127	18	41	44	24	436	309	124.3	169.5	293.8
1885	138	122	30	20	36	36	447	322	128.3	181.9	310.2
1886	138	143	43	30	34	34	460	317	139.82	182.37	322.19
1887	143	128	32	28	28	33	460	328	137.22	184.12	321.34
1888	137	125	33	26	35	28	465	339	150.49	183.59	334.08
1889	155	158	41	38	34	36	494	337	161.06	175.80	336.86
1890	276	223	79	28	63	53	602	364	166.52	184.57	351.09
1891	173	165	42	40	37	38	527	372	175.62	184.99	360.61

OPHTHALMOLOGICAL REPORT.

BY A. C. NASON, ASSISTANT PHYSICIAN.

*To the Superintendent of the New Hampshire Asylum
for the Insane:*

SIR, — It is with pleasure that I herewith submit the following report, setting forth in a more or less tabulated form the results of the work done in this department during the past year. The examinations have, in some cases, been incomplete and unsatisfactory, owing to the mental condition of the patients. In a few of the more restless patients considerable difficulty was experienced in fixing their attention long enough to get a satisfactory view of the fundus oculi either by the “direct” or the “indirect” method. Only those, however, are included in the number about to be described about which I can speak with confidence. In most cases the ophthalmoscopic examinations were made both by the “indirect” and the “direct” method, the former for obtaining a general view of the fundus, and the latter for studying more in detail the minute changes often observed in the retina and disc. In the few cases in which a mydriatic seemed necessary, homatropine was used. Besides the use of the ophthalmoscope the examinations have, wherever practicable, included observations on the tension of the eyeball; conditions of the pupil, as to size, reaction both to light and accom-

modation; the muscular apparatus has also been tested by prisms whenever practicable, and so far as possible errors of refraction have been noted. In but a few cases has an attempt been made to test the field of vision. I am convinced, however, that this is a very important point in the examination of the eyes of the insane, and in subsequent cases an endeavor will be made to get reliable data on this point in a larger proportion of the cases. In all, one hundred and twelve patients have been examined. The history of many others has been excluded as being too incomplete and unsatisfactory to be of value. In this first report it is proposed, as stated above, to speak only in a general way of the conditions found in the different groups or forms of mental disorders, and not of the individual cases, this for several reasons; the actual lesions were not well defined enough to warrant the giving in detail the exact ophthalmoscopic picture in each eye, such an account would be too long and tedious, and would necessitate very frequent repetitions, and, again, it is not necessary for the fulfillment of the purpose which this report is intended to serve.

The classification of the mental disorders here adopted is chosen because of its simplicity and also because, in the appearances observed in the fundus oculi of the different classes, there were not enough constant or common lesions to warrant a finer subdivision. The classification is as follows:

1. Paretic Dementia.
2. Mania — (*a*) Acute; (*b*) Chronic; (*c*) Recurrent.
3. Melancholia — (*a*) Acute; (*b*) Chronic.
4. Dementia — (*a*) Primary; (*b*) Secondary.
5. Epilepsy.

Of the 112 cases examined 4 were cases of Paretic Dementia.

38 of Mania, viz., (*a*) Acute, 2; (*b*) Chronic, 31; (*c*) Recurrent, 5.

25 of Melancholia, viz., (*a*) Acute, 10; (*b*) Chronic, 15.

37 of Dementia, viz., (*a*) Primary, 9; (*b*) Secondary, 28.

8 of Epilepsy.

PARETIC DEMENTIA, 4 CASES.

These were all in the third stage of the disease. In two, inequality of the pupils was noted; in all, the pupils reacted sluggishly to light but more readily to accommodation; in one there was distinct atrophy of the o. d., while in the other three a state of hyperæmia existed with more or less indistinctness of outline in the o. d. In the two cases of acute mania, the o. d. was rather paler in one than normal, while the retina was covered with fine blood vessels, and looked to be in what might be termed an irritable condition; in the other case there were large and deep physiological cups with hyperæmia of both discs and retina; the blood vessels were also tortuous. In neither of these cases could the vision be tested with any degree of accuracy.

CHRONIC MANIA, 31 CASES.

Of these only four present a normal ophthalmoscopic appearance, and in none of these can the vision be brought up to $\frac{20}{20}$, even by carefully correcting all errors of refraction. Nineteen show signs of inflammatory action, or, hyperæmia to a greater or less extent, both of the discs and retina varying from a slightly reddened and irritable state to, in some cases, quite neuro-ret-

initis; in four the loss of pigment matter in the retina allows the choroidal blood vessels to be plainly seen; in four there is a low grade of myopia, while in the others the refraction is either normal or in a few instances slight hyperopia exists. In only three cases could vision be brought up to the normal standard by means of lenses; in one of these cases where the vision was only $\frac{20}{200}$, the patient was able to read $\frac{20}{20}$ by the aid of a lens of only 2 D. In seven of these cases there was found a ring of pigment matter partially encircling the disc and generally on the lower and temporal side. In several cases small spots or specks, spoken of by Noyes as "pin points," were observed in the retina. In none of these cases was there found any evidence of atrophic changes in the o. d. T. was found normal in every case; the pupils reacted to light but in most cases sluggishly. The muscular apparatus was tested in too few cases to be of any value.

RECURRENT MANIA, 5 CASES.

In two the ophthalmoscopic appearance was normal, although the vision could not be brought above $\frac{20}{50}$ in either case after correcting refractive errors. In the other three there was hyperæmia, both of o. d. and retina in each case; in one there was some swelling of the disc with edges quite indistinct. The vision ranged in these cases from $\frac{20}{40}$ to $\frac{20}{70}$. The pupils were small in each case, but they reacted properly to light and accommodation. The muscular apparatus was not tested. F. of V. normal.

ACUTE MELANCHOLIA, 10 CASES.

In three of these there is hyperæmia of o. d. and retina, while in one there is marked neuritis with con-

siderable swelling of the disc and indistinctness of outline; the field of vision was markedly contracted all around, V. $\frac{20}{50}$, not improved by glasses.

In one a very deep physiological cup reached nearly to the edge of the disc in both eyes; in this case there was also marked contraction in the field of vision; there was slight œdema and exudation on retina. V. $\frac{20}{70}$ both eyes.

In five cases the appearance of fundus was normal although the vision was considerably reduced in all but one.

CHRONIC MELANCHOLIA, 15 CASES.

In seven there was hyperæmia of discs and retinae more or less marked with a fine network of blood vessels over the whole retina; in two of these the choroidal vessels could be distinctly seen; in one the retina had a granular look with numerous specks of pigment matter scattered about, especially in and about the yellow spot, notwithstanding this fact vision was $\frac{20}{20}$ in this case. In the remaining seven the ophthalmoscopic appearance was normal, excepting in three where the characteristic appearance of myopia or astigmatism was present. In all the pupils reacted sluggishly to light and were, in most cases, larger than normal. In none could the muscular condition or the F. of V. be made out satisfactorily. In but two of the cases could the vision be brought up to the normal standard, the range being from $\frac{20}{30}$ in the best eyes to $\frac{20}{100}$ in the poorest.

DEMENTIA, 37 CASES.

This includes both the primary and secondary forms as there are no constant differences in the two. In none of these was it practical to make any other than ophthal-

moscopic examination. In this class of cases certain peculiar conditions of the retina and choroid were so constantly found that they came to be looked upon as almost characteristic lesions; these peculiarities consist of an apparent thinning and striated appearance of the retina, and in some instances a sort of granular or muddy look was noted. There was in these cases a marked diminution in the pigment layer of the retina which allowed the choroidal vessels to be plainly seen. I am well aware that it is not at all uncommon to find much this same appearance in healthy eyes, but the actual percentage is very small compared with that of the cases under consideration where no less than twenty-one out of the thirty-seven presented the appearances above described in a more or less marked degree. In six there was a reddened, irritable condition of both o. d. and retina; in five there was considerable paleness of the o. d., while in only seven was the fundus oculi found to be normal in appearance.

EPILEPSY, 7 CASES.

In but one of these cases is the dementia marked; in this one there is considerable atrophy of both optic discs with a very large scleral ring, dotted with numerous spots of pigment matter; the retina has a granular appearance, with here and there streaks and splotches of pigment. In two, although there was no squinting, an insufficiency of the internal recti was found, which required in each case a prism of ten degrees to overcome. In one of these the amount of weakness or insufficiency varied from day to day, apparently being influenced by the approach of an epileptic seizure; once, when examined soon after an attack of maniacal excitement following several fits, no deviation could be

found by the prism test. In three an attempt to move the eyes from one extreme position to another was accompanied by a peculiar tremulousness characteristic of muscular insufficiency. In all, the F. of V. was normal. Vision was defective in all but one. In five a hyperæmic condition of the whole fundus was observed.

TREASURER'S REPORT.

To the Trustees of the New Hampshire Asylum for the Insane:

The following statement of receipts and expenditures, from October 1, 1890, to September 30, 1891, inclusive, is respectfully submitted.

RECEIPTS.

Balance on hand	\$7,092.51
Cash received for board of private patients	52,089.17
received for board of town patients .	3,606.30
received for board of county patients	5,845.25
received of financial agent for aid to patients	10,000.00
received of state treasurer for aid to indigent patients	6,000.00
received of state treasurer for board of criminal insane	4,393.61
received of state treasurer for board of patients transferred to state support by order of commissioners of lunacy	13,020.07
received of financial agent as income from Isaac Adams fund	180.00
received of state treasurer for appropriation for barn improvements .	5,000.00
received for stock and articles sold .	1,250.76
	<hr/>
	\$108,477.67

EXPENDITURES.

Cash paid for meats	\$11,234.97
flour	2,300.40
butter and cheese	3,235.70
sugar and molasses	1,738.88
fish	2,485.69
coffee and tea	1,358.39
potatoes, fruit, and vegetables	917.42
all other table supplies	7,222.85
house furnishing goods	6,401.98
articles furnished and charged	3,193.19
lighting and heating	16,503.50
medical and surgical supplies	1,067.25
services of all forms in care of patients and household	24,675.14
ordinary repairs of buildings	4,671.42
permanent improvements, in- cluding all additions to and alterations upon farm build- ings	7,661.15
provender	1,459.62
farm expenses, including ser- vices, farming implements, and all improvements of farm and grounds	9,700.88
stationery, library, and print- ing	489.44
postage, express, and freights	409.57
traveling expenses of trustees	124.00
public exercises, including Sunday services, and all public means to interest and occupy patients	927.20

Cash paid for expenses incurred in main- taining work-shop for men during six months . . .	\$180.00
miscellaneous items . . .	384.91
	<hr/>
Whole amount expended . . .	\$108,343.55
Balance of income carried to new account .	134.12
	<hr/>
	\$108,477.67

C. P. BANCROFT,
Treasurer.

CONCORD, October 1, 1891.

I have carefully examined the accounts of the treasurer of the New Hampshire Asylum for the Insane for the fiscal year ending September 30, 1891, and find them clearly and accurately kept, and sustained by the proper vouchers.

F. D. AYER, *Auditor.*

CONCORD, N. H., October 27, 1891.

REPORT OF BUILDING COMMITTEE.

The committee for the expenditure of the state appropriation of \$8,000, made by the last Legislature, present the following report of their receipts and expenditures from January 1, 1891, to September 30, 1891. These have appeared in the treasurer's report, but are itemized as follows :

RECEIPTS.

From state treasurer	\$5,000.00
treasurer of New Hampshire Asylum	
advanced from ordinary account .	<u>1,133.07</u>
	\$6,133.07

EXPENDITURES.

Paid N. E. Granite Co., for stone foundation	\$39.00
Ola Anderson, for stone foundation .	85.00
L. R. Fellows & Son, for work on cellar wall under barn	131.33
Brown's Lumber Co., for spruce frame and boards for silos	162.92
G. L. Theobald, for excavating and grading	278.78
E. B. Hutchinson, for erecting pig-gery and slaughter-house . .	1,500.00
E. B. Hutchinson, for erecting pig-gery and slaughter-house . .	2,000.00

Paid Foss & Merrill, for surveying . . .	\$10.50
E. B. Hutchinson, for erecting pig- gery and slaughter-house . . .	1,500.00
L. R. Fellows & Son, for work on vegetable cellar	38.00
Concord Foundry Co., for 80 iron pig troughs	264.00
H. McAlpine, for painting roof of piggery	98.97
Humphrey & Dodge, for lead pipe .	24.57
	<hr/>
	\$6,133.07

WATERMAN SMITH,
J. B. WALKER,
C. P. BANCROFT,
Committee.

TWENTY-FIFTH ANNUAL REPORT OF THE FINANCIAL AGENT.

To the Trustees of the New Hampshire Asylum for the Insane:

The Financial Agent respectfully presents this report of his receipts and expenditures from October 9, 1890, to September 30, 1891, inclusive; and of the amounts and investments of the funds in his custody at this date.

RECEIPTS.

Cash on hand October 9, 1890 . . .	\$2,327.27
for interest and dividends . . .	15,620.91
	<hr/>
	\$17,948.18

EXPENDITURES.

Cash paid J. P. Bancroft, treasurer, one quarter's appropriation to indigent patients, etc., and six months income of Adams fund	\$2,590.00
C. P. Bancroft, treasurer, two quarters' appropriation to indigent patients, etc. . . .	5,000.00
for insurance	899.50
stocks purchased	329.60
Long Pond Cottage	2,800.00

Cash paid for land at Long Pond . . .	\$379.00
salary of financial agent, rent of box in Boston Safe De- posit and Trust Co., and sundry small expenses . . .	936.51
Balance carried to new account . . .	5,013.57
	<hr/>
	\$17,948.18

ADAMS FUND.

(Gift of Isaac Adams, of Sandwich.)

10 shares Pittsburg, Fort Wayne & Chi- cago Railroad stock	\$1,000.00
2 United States bonds	600.00
1 Iowa Loan & Trust Co. bond	1,000.00
4 shares Suffolk National Bank stock .	400.00
	<hr/>
	\$3,000.00

BURROUGHS FUND.

(Legacy of Rev. Charles Burroughs, D. D., of Ports-
mouth.)

1 St. Louis County bond	\$1,000.00
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CHANDLER FUND.

(Legacy of Abial Chandler, of Walpole.)

25 shares Portland, Saco & Portsmouth Railroad stock	\$2,500.00
37 shares Boston & Maine Railroad stock	3,700.00
100 shares Chicago, Rock Island & Pacific Railroad stock	10,000.00
10 shares Pittsburg, Fort Wayne & Chi- cago Railroad stock	1,000.00
10 shares Michigan Central Railroad stock	1,000.00
3 shares National State Bank stock . .	300.00

2 Chicago Water Loan bonds . . .	\$2,000.00
3 Northern Pacific Railroad bonds . .	3,000.00
2 Chicago, Burlington & Quincy Railroad bonds	2,000.00
1 Chicago & Northwestern Railroad bond	1,000.00
1 New Hampshire registered bond . .	200.00
6 Iowa Loan and Trust Company bonds .	3,300.00
	<hr/>
	\$30,000.00

CONANT FUND.

(Gift of John Conant, of Jaffrey.)

4 Iowa Loan & Trust Company bonds .	\$4,000.00
1 New Hampshire Trust Company bond .	500.00
1 Boston & Albany Railroad bond . .	1,000.00
3 shares Boston & Maine Railroad stock .	300.00
2 shares Boston & Providence Railroad stock	200.00
	<hr/>
	\$6,000.00

DANFORTH FUND.

(Legacy of Mary Danforth, of Boscawen.)

4 shares Suffolk National Bank stock .	\$400.00
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FISK FUND.

(Legacy of Miss Catherine Fisk, of Keene.)

This fund is held in trust by the State, in
accordance with an act of the Legisla-
ture, approved August 4, 1887 . . . \$21,378.43

FULLER FUND.

(Legacy of Mrs. Peggy Fuller, of Francestown.)

6 shares of Boston & Maine Railroad stock	\$600.00
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KENT FUND.

(Legacy of Moody Kent, of Pittsfield.)

8	Chicago River Improvement bonds	.	\$8,000.00
6	Cleveland bonds	. . . . .	6,000.00
17	Concord bonds	. . . . .	17,000.00
3	Minneapolis bonds	. . . . .	3,000.00
3	United States bonds	. . . . .	1,200.00
10	Spokane & Palouse Railroad bonds	.	10,000.00
5	Oregon Short Line Railroad bonds	.	5,000.00
5	Eastern Railroad bonds	. . . . .	5,000.00
10	St. Joseph & Grand Island Railroad bonds	.	10,000.00
9	Burlington & Missouri River Railroad bonds	. . . . .	9,000.00
19	Chicago, Burlington & Quincy Railroad bonds	. . . . .	19,000.00
1	Chicago & Northwestern Railroad bond	.	1,000.00
7	Philadelphia, Wilmington & Baltimore Railroad bonds	. . . . .	7,000.00
10	Boston & Lowell Railroad bonds	.	10,000.00
4	Northern Pacific Railroad bonds	. . . . .	4,000.00
50	shares Pittsburgh, Fort Wayne & Chicago Railroad stock	. . . . .	5,000.00
32	shares Northern Railroad stock	. . . . .	3,200.00
100	shares Michigan Central Railroad stock	.	10,000.00
2	shares Boston & Providence Railroad stock	. . . . .	200.00
50	shares Union Pacific Railroad stock	.	5,000.00
10	shares Chicago, Rock Island & Pacific Railroad stock	. . . . .	1,000.00
50	shares Fitchburg National Bank stock	.	5,000.00
47	shares State National Bank stock	.	4,700.00
7	shares Railroad National Bank stock	.	700.00
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			\$150,000.00

KIMBALL FUND.

(Legacy of Jacob Kimball, of Hampstead.)

This fund is held in trust by the State, in
accordance with an act of the Legisla-
ture

\$6,753.49

PENHALLOW FUND.

(Legacy of H. Louise Penhallow, of Portsmouth.)

1 Boston & Lowell Railroad bond . . . \$1,000.00

PIPER FUND.

(Legacy of Rhoda C. Piper, of Hanover.)

1 share Railroad National Bank . . . \$100.00

RICE FUND.

(Legacy of Arabella Rice, of Portsmouth.)

8 New Hampshire Trust Co. bonds . . . \$7,000.00

5 Oregon Short Line Railroad bonds . . . 5,000.00

3 Northern Pacific Railroad bonds . . . 3,000.00

1 United States registered bond . . . 5,000.00

\$20,000.00

RUMFORD FUND.

(Legacy of Countess Rumford, of Concord.)

5 Philadelphia, Wilmington & Baltimore

Railroad bonds \$5,000.00

5 Burlington & Missouri River Railroad

bonds 5,000.00

30 shares Pittsburgh, Fort Wayne & Chi-

cago Railroad stock 3,000.00

20 shares Boston & Providence Railroad

stock 2,000.00

\$15,000.00

SHERMAN FUND.

(Legacy of Mrs. Fanny Sherman, of Exeter.)

3 Iowa Loan and Trust Company bonds .	\$3,000.00
1 St. Louis County bond	1,000.00
1 Boston & Lowell Railroad bond . .	1,000.00
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	\$5,000.00

SMITH FUND.

(Legacy of Betsey S. Smith, of New Ipswich.)

1 New Hampshire Trust Company bond .	\$500.00
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SPALDING FUND.

(Legacy of Hon. Isaac Spalding, of Nashua.)

10 Cleveland bonds	\$10,000.00
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WILLIAMS FUND.

(Gift of John Williams, of Hanover.)

2 shares Railroad National bank . . .	\$200.00
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CONTINGENT FUND.

(This fund, created to meet contingencies, is not a permanent fund, and varies in amount from year to year.)

Deposit in New Hampshire Savings Bank,

January, 1891	\$364.87
Two installments on Boston & Maine Railroad stock	280.00
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	\$644.87

The foregoing permanent funds, seventeen in number, amount to two hundred and seventy-five thousand nine hundred and thirty-one dollars and ninety-two

cents. At several times, during the early years of the asylum, the insufficiency of state appropriations for the erection of new buildings was made good by withdrawal of principal from its benevolent funds, whereby the amount was reduced. The trustees subsequently decided that all gifts and legacies, when not otherwise ordered by the donors, should be maintained at their original amounts, and their income only be expended. The financial agent was instructed to take action accordingly, and the restoration of all has been accomplished with the exception of four, viz., the Fuller fund of two thousand dollars partially restored; the Plummer fund of five hundred dollars, the gift of William Plummer, of Londonderry; the Pillsbury fund of one hundred dollars, the gift of Samuel Pillsbury; and the Hall fund of two hundred and two dollars and ten cents, a gift of Horace Hall of Charlestown.

It is anticipated that, during the ensuing year, these restorations, amounting to nearly twenty thousand dollars (\$19,700), will have been completed, and that every donor will afterwards and forever be a contributor of the interest of his or her particular fund to the benevolent uses of the asylum.

Respectfully submitted,

J. B. WALKER,
Financial Agent.

CONCORD, N. H., October 1, 1891.

I hereby certify that I have examined the accounts of the financial agent of the New Hampshire Asylum for the Insane from October 8, 1890, to September 30, 1891, inclusive, and find the same correctly cast and properly vouched for.

I have also examined the securities of the said asylum in the Boston Safe Deposit and Trust Company, and find them all on hand and agreeing with the foregoing statement.

F. D. AYER, *Auditor*.

CONCORD, N. H., November 9, 1891.

GENERAL EXHIBIT.

*Products of the Farm and Garden at Market Value,
for the year 1891.*

Asparagus . . .	80 bunches, @ \$0.10	\$8.00
Rhubarb . . .	2,025 pounds, .01	20.25
Lettuce . . .	1,800 heads, .03½	63.00
Cucumbers . . .	266 dozen, .15	39.90
Summer squash . . .	17 barrels, 2.00	34.00
Winter squash . . .	8½ tons, 20.00	170.00
Peas . . .	41 bushels, 1.00	41.00
Radishes . . .	190 bunches, .04	7.60
Beet greens . . .	28 bushels, .50	14.00
Cauliflower . . .	50 heads, .10	5.00
String beans . . .	28 bushels, 1.00	28.00
Shell beans . . .	15 “ 1.00	15.00
Pickling cucumbers	14 “ 1.00	14.00
Tomatoes (ripe) . .	60 “ 1.00	60.00
Tomatoes (green) . .	12 “ .50	6.00
Sweet corn . . .	473 dozen .10	47.30
Melons . . .	60 .05	3.00
Early Cabbage . . .	1,750 heads, .07	122.50
Winter Cabbage . . .	1,800 “ .06	108.00
Cabbage fed to cows	3,076 “ .	20.00
Beets . . .	119 bushels, .50	59.50
Potatoes . . .	460 “ .65	299.00
Small potatoes . . .	60 “ .20	12.00

Record of Cows for year ending September 30, 1891.

[illegible]

Average number cows.....	27.66
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Average amount per day.....	217 quarts.
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GENERAL EXHIBIT.

165

Cattle beets . . .	300 bushels, @	\$0.25	\$75.00
Rutabaga turnips . .	102 "	.50	51.00
Turnips for cattle . .	256 "	.20	51.20
Carrots . . .	48 "	.40	19.20
Early celery . . .	740 heads,	.40	74.00
Late celery . . .	7,000 "	.10	700.00
Onions . . .	65 bushels,	.75	48.75
Onions (scullions) . .	60 "	.10	6.00
Parsnips . . .	10 "	.75	7.50
Hay . . .	85 tons,	17.00	1,445.00
Corn stover . . .	6 "	8.00	48.00
Corn, for soiling . .	55 "	3.00	165.00
Oats, for soiling . .	15 "	3.00	45.00
Grass . . .	10 "	2.50	25.00
Rowen . . .	10 "	10.00	100.00
Hungarian . . .	1½ tons	6.00	9.00
Oat hay . . .	1½ "	8.00	12.00
Corn ensilage . . .	28 "	2.50	70.00
Rowen ensilage . . .	16 "	2.00	32.00
Milk produced	79,196 quarts,	.05	3,959.80
Pork for use . . .	1,200 pounds,	.04	48.00
Calves sold . . .	20	1.50	30.00
Ice cut . . .	2,465 cakes,	.06	147.90
Ice sold . . .	3,644 "	.04	145.76
			<hr/>
			\$8,512.16

Articles made in Sewing-Room.

Mattresses	57
Pillow ticks	80
Bed spreads	98
Comfortables	2
Sheets	515

Pillow slips	535
Carpets	4
Mats	53
Table covers	49
Napkins	119
Tray cloths	12
Towels	857
Stand cloths	52
Curtains	105
Laundry bags	8
Flag	1
Chairs upholstered	14
Lounges upholstered	2
Hassocks	5
Dresses	96
Basques	6
Dresses cut	6
Waists	4
Nightdresses	7
Skirts	33
Chemises	4
Drawers	8
Nurses' aprons	58
Gents' aprons	46
Shirts	28
Coats	4
Bibs	8

296 days of mending and miscellaneous work.

Made in Kitchen for general use of House.

Pickles	.	.	.	.	.	.	6 barrels.
Piccalilli	.	.	.	.	.	.	3 “
Catsup	.	.	.	.	.	.	8 gallons.
Mangoes	.	.	.	.	.	.	2 barrels.
Fruit and berries canned	.	.	.	.	.	.	319 quarts.
Marmalade	.	.	.	.	.	.	29 “
Jelly	.	.	.	.	.	.	203 tumblers.
Mincemeat	.	.	.	.	.	.	2 barrels.

APPENDIX.

APPENDIX.

DIRECTIONS CONCERNING ADMISSION.

Those wishing the admission of a person to the asylum should make application to the superintendent previously to bringing the patient, unless the urgency of the case precludes it.

On application, full information as to terms, conditions, etc., and the necessary papers will be furnished.

With the application a brief statement of the case should be given.

Some person should accompany the patient who can give a correct history of the case, if possible.

On no account should deception be practiced. The necessity of this step and the arrangements having first been settled, the patient should be honestly informed of what is to take place.

When possible, it is better that patients should arrive in day trains.

Patients should not bring valuable property when committed, and the asylum cannot become responsible for its keeping. Such articles should be left at home, unless the patient is fully responsible for their care.

The parties committing a patient, whether private individuals or town officers, are required to give a bond for the payment of expenses in the annexed form, signed by two responsible persons. The certificates of physicians should be filled and signed in all cases, except those committed by courts, and be written in the annexed form.

FORM OF BOND.

In consideration of the admission of _____, of the town of _____, in the county of _____, and State of _____, as a boarder at the New Hampshire Asylum for the Insane, in the city of Concord, we, of the town _____, in the county of _____ and State of _____, and _____, of the town of _____, in the county of _____, and State of _____, jointly and severally promise to agree to and with said New Hampshire Asylum for the Insane, to pay its treasurer _____ dollars and _____ cents per week, or such other rate as may from time to time be established by said asylum therefor, while he shall remain at said asylum; together with such extra charge as may be occasioned by _____ requiring more than the ordinary care and attention; to pay any reasonable charge for actual damage done by _____ to buildings or furnishings; to assist in returning _____ to said asylum in case of elopement; to remove _____ from said asylum when required to do so by the superintendent; to pay funeral charges in case of death; and not to hold said asylum responsible for any money, jewelry, watches, or other valuables in _____ possession on admission, or given to _____ afterwards.

Payments to be made quarterly, and interest on all sums not paid at the end of each quarter.

Witness our hands, this _____ day of _____, 189 .

Attest :

Principal. [L. s.]

Surety. [L. s.]

NOTE. — Those committing patients are requested to notice the condition in regard to money, jewelry, etc.

FORM OF PETITION.

To be filled and signed by those desiring aid from the state appropriation, to be sent to the superintendent.

To His Excellency the Governor of the State of New Hampshire :

Respectfully represents that _____, an insane person, resident of _____ in this State, is without sufficient property or relatives legally liable for _____ support at the New Hampshire Asylum for the Insane. Wherefore the undersigned prays that the said _____ be aided by any funds appropriated by the State for the indigent insane.

Dated at _____, _____, 189 .

We, the undersigned, selectmen of _____, hereby certify that the representations in the above petition are in our belief true, and that said _____ is an indigent insane person.

N. B.—Please write whether the insane person has any property, and, if so, what amount, and any other facts you may think proper in relation to the ability of the insane person's near relatives.

NOTE.—The amount received by the applicant, it will be understood, is regulated entirely by the number who may apply for aid, and the comparative need of assistance.

ORDER FOR SUPPORT OF TOWN AND COUNTY PATIENTS.

We, _____, hereby order the committal of _____ to the New Hampshire Asylum for the Insane, at Concord, there to be supported at the expense of _____, in accordance with the statute, during _____ residence at said asylum.

_____ 189 .

NOTE.—To be signed by mayor, selectmen, or overseer of poor in case of town charge; by county commissioner in case of county charge.

N. B.—Admission will be refused unless the requirements of the law are strictly complied with. See extract from the laws at the foot of this blank.

FORM OF CERTIFICATE OF INSANITY.

REQUIRED FOR ADMISSION OF PATIENTS.

After due inquiry and personal examination of _____, of
 _____, made within one week prior to date, we certify
 that _____ is insane, and a fit subject for treatment at the
 New Hampshire Asylum for the Insane.

_____, _____, M. D.

_____, _____, M. D.

_____, _____, 189 .

Having personal acquaintance with the signers of the
 above certificate, I certify that the signatures are genuine, and
 the signers reputable physicians.

_____, _____, 189 .

EXTRACT FROM THE LAWS OF NEW HAMPSHIRE.

SECTION 18. No person shall be committed to the asylum for the insane, except by the order of the court or the judge of probate, without the certificate of two reputable physicians that such person is insane, given after a personal examination made within one week of the committal; and such certificate shall be accompanied by a certificate from the judge of the supreme court, or court of probate, or mayor, or chairman of the selectmen, testifying to the signatures, and the respectability of the signers.

L A W S

RELATING TO THE NEW HAMPSHIRE ASYLUM FOR THE INSANE.

THE NEW HAMPSHIRE ASYLUM FOR THE INSANE.

SECTION

1. Corporate name.
2. Trustees, how appointed.
3. Tenure of office of trustees.
4. Trustees to manage affairs of asylum.
5. To appoint officers, etc.
6. Trustees not to receive compensation.
7. To make regulations.
8. May hold property in trust.
9. Shall make report annually.
10. Board of visitors and their duties.
11. Asylum's land taken for highways only by authority of legislature.
12. Property of asylum exempt from taxation.
13. Annual appropriation to library.

COMMITMENT TO ASYLUMS.

14. Parent, guardian, etc., may commit.
15. Insane paupers, how committed by town.
16. County paupers, how committed.
17. Dangerous insane persons, how committed.
18. Certificate of two physicians required to commit.
19. Regulations for commitments to the asylum to govern commitments to other institutions.

SUPPORT AT ASYLUM.

20. When county shall support insane person.

SECTION

21. When means of support fail, counties to support on notice.
22. What inmates of asylum for insane supported by state.
23. County may recover expense paid.
24. Concord not liable.
25. Certain insane persons to be supported by state.
26. Annual appropriation for indigent insane.

DISCHARGE FROM ASYLUM.

27. How discharged from asylum.
28. Trustees to visit asylum and hear statements of patients.
29. Superintendent to furnish stationery to patients, and transmit their letters to trustees.

CORONER'S INQUEST IN CASE OF SUDDEN DEATH.

30. Inquest on patient suddenly deceased.

COMMISSION OF LUNACY.

31. Insane persons wards of state.
32. Commission of lunacy.
33. Powers and duties of commission of lunacy.
34. Records and reports of commission of lunacy.
35. Superintendents to make reports to commission of lunacy.
36. Annual appropriation for expenses of commission.

THE NEW HAMPSHIRE ASYLUM FOR THE INSANE.

SECTION I. The asylum for the insane, at Concord, is a corporation under the name of the New Hampshire Asylum for the Insane.

SECT. 2. The government of the asylum is vested in twelve trustees, appointed and commissioned by the governor, with advice of the council; and all vacancies shall be filled in the same manner.

SECT. 3. The trustees are classified and commissioned in such manner that the offices of three trustees become vacant annually.

SECT. 4. The trustees shall take charge of the property and concerns of the asylum; shall see that its affairs are conducted properly; may enter into and bind the asylum by such contracts relative to the support of patients and the affairs of the asylum as they may deem advantageous; and may receive, appropriate, control, convey, or invest any property given to or owned by the asylum in such manner as they may think expedient.

SECT. 5. The trustees shall appoint a secretary, who shall keep a full and fair record of their proceedings; a treasurer, who shall give bond for the faithful discharge of his duty; and such physicians, officers, and assistants, with such salaries and allowances, as may from time to time be found necessary.

SECT. 6. No trustee shall receive any compensation for his services as trustee; but expenses necessarily incurred by him shall be paid by the asylum.

SECT. 7. The trustees may make such regulations for their own government, for the management of the asylum and all persons connected therewith, and for the admission and care of patients, and the same from time to time alter, as convenience may require.

SECT. 8. The asylum may take and hold in trust any grant or devise of real estate, or any donation or bequest of personal property, and may apply the same, unless otherwise restricted to lessen the expenses of the indigent insane.

SECT. 9. The trustees shall make to the governor and council, annually, a report, covering that of the superintendent to them, of the receipts and expenditures of the asylum,

the number of patients admitted and discharged during the year, and all other matters connected with the general interests of the asylum. It shall be filed in the office of the secretary of state on or before the first day of December.

SECT. 10. The governor and council, president of the senate, and speaker of the house shall constitute a board of visitors of the asylum; shall visit and inspect the same when necessary; examine into the condition of the patients, and the regulations and general management of the asylum; see that the design thereof is carried into full effect; and make to the legislature, at each biennial session, a report which shall be furnished to the secretary of state on or before the first day of the December next preceding such session.

SECT. 11. No land connected with the asylum shall be taken for a highway or other public use, except by the express authority of the legislature, for that purpose first had and obtained.

SECT. 12. The property of the asylum is exempted from taxation.

SECT. 13. The sum of one hundred dollars is annually appropriated toward the support and increase of the library of the asylum.

COMMITMENT TO ASYLUMS.

SECT. 14. The parent, guardian, or friends of any insane person may cause him to be committed to the asylum, with the consent of the trustees, and there supported on such terms as they may agree.

SECT. 15. Any insane pauper supported by a town may be committed to the asylum by order of the overseers of the poor, and there supported at the expense of the town.

SECT. 16. If the overseers neglect to make such order in relation to any insane county pauper, the supreme court, or any judge thereof in vacation, may order such pauper to be committed to the asylum, and there supported at the expense of the county.

SECT. 17. If any insane person is in such condition as to render it dangerous that he should be at large, the judge of probate, upon petition by any person and such notice to the selectmen of the town in which such insane person is or to his guardian or any other person as he may order, may commit such insane person to the asylum; and such petition may be filed, notice issued, and hearing had in vacation or otherwise.

SECT. 18. No person shall be committed to the asylum for the insane, except by an order of the court or the judge of probate, without the certificate of two reputable physicians that such person is insane, given after a personal examination made within one week of the committal. Such certificate shall be accompanied by a certificate of a judge of the supreme court or court of probate, mayor, or one of the selectmen, certifying to the genuineness of the signatures and the respectability of the signers.

SECT. 19. All laws relative to the commitment of insane persons to the New Hampshire Asylum for the Insane shall govern the commitment of insane persons to all other places in this state where insane persons are confined; but no insane person, other than a pauper, shall be admitted to any county asylum.

SUPPORT AT ASYLUM.

SECT. 20. Any insane person committed to the asylum by his parent, guardian, or friends, who has no means of support and no relatives of sufficient ability chargeable therewith, and no settlement in any town in this state, and who is in such condition that his discharge therefrom would be improper or unsafe, shall be supported by the county from which he was committed.

SECT. 21. When the means of support of any inmate of the asylum shall fail or be withdrawn, the superintendent shall immediately cause notice in writing of the fact to be given to one of the county commissioners of the county from which such inmate was committed; and such county shall

pay to the asylum the expense of the support of such inmate from and after the service of such notice, and for ninety days next prior thereto.

SECT. 22. Any insane person charged with an offense, the punishment whereof is death or confinement in the state prison, committed to the asylum by order of the supreme court, shall be supported at the expense of the state during his confinement there. Any other insane person committed to the asylum by the supreme court or a judge thereof, and any insane person committed by a judge of probate, shall be supported by the county from which he was committed.

SECT. 23. The county or town paying the expense of the support of an inmate of the asylum shall be entitled to recover the amount so paid of the inmate himself, if of sufficient ability to pay; otherwise of the town, county, or person by law liable for his support.

SECT. 24. The city of Concord shall not be liable for the support of any insane person committed to the asylum unless he was committed from such city.

SECT. 25. Any insane person who has been an inmate of the asylum for twenty years and been supported in whole or in part during that time by others than the town or county chargeable therewith, and who has no means of support and no relations chargeable therewith, and who cannot properly be discharged from the asylum, shall be supported there at the expense of the state.

SECT. 26. The sum of six thousand dollars is annually appropriated for the support at the asylum of such indigent insane persons belonging to the state as the governor, from time to time, may designate; but two thirds at least of the sum shall be applied to the support of private patients who are not maintained at public charge.

DISCHARGE FROM ASYLUM.

SECT. 27. Any person committed to the asylum may be discharged by any three of the trustees, by the commission of

lunacy, or by a justice of the supreme court, whenever a further detention at the asylum is, in their opinion, unnecessary; but any person so discharged who was under sentence of imprisonment at the time of his commitment, the period of which shall not have expired, shall be remanded to prison.

SECT. 28. Some one of the trustees, without previous notice, shall visit the asylum at least twice every month, and give suitable opportunity to every inmate therein to make to him, in private, any statements such patient may wish to make; and, whenever he deems it proper, he shall call to his aid two other trustees, who shall, with him, make a further examination of such inmate and of the statements by him made. If, in their judgment, a further detention is unnecessary, it shall be their duty to discharge such inmate. They may order such immediate change in the treatment of any inmate as they deem judicious; and, in case of failure to secure it, they shall at once summon a meeting of the whole board, whose duty it shall be to take such measures as the exigency of the case demands.

SECT. 29. The superintendent shall furnish stationery to any inmate who desires it; and shall transmit promptly and without inspection, to the trustee whom the board may designate, all letters addressed to the board by inmates of the asylum.

CORONER'S INQUEST IN CASE OF SUDDEN DEATH.

SECT. 30. In event of the sudden death of any inmate, a coroner's inquest shall be held, as provided for by law in other cases.

COMMISSION OF LUNACY.

SECT. 31. All persons deprived of their liberty in this state by being committed to custody as insane persons, shall be wards of the state and subject to state supervision.

SECT. 32. The state board of health shall constitute a commission of lunacy.

SECT. 33. The commission, by one or more of their members, shall, without previous notice, visit and make thorough inspections of all asylums and other institutions for insane persons in the state, as often as once in four months. They shall examine into the care and treatment of the insane, the sanitary condition of each asylum or institution, and all other matters relating to the general welfare of the inmates. They may order the removal of any indigent insane person to the New Hampshire Asylum for the Insane for remedial treatment, and such person while under such treatment shall be supported at the expense of the state. When the need of such treatment shall cease, the commission shall so notify the county, town, or relative liable for the support of such inmate, and if he is longer continued at the asylum it shall be at the expense of such county, town, or relative.

SECT. 34. The commission shall keep a correct record of the number of commitments, discharges, and deaths at each asylum, institution, or other place of detention, and of the age, sex, and nationality of each person committed, discharged, or deceased, and shall report the same annually to the governor and council, with any other matters or recommendations which in their judgment are important.

SECT. 35. The superintendent of every asylum or other place in this state where insane persons are confined, shall, within three days after the commitment thereto of any person, notify the commission thereof, upon blanks furnished for that purpose; and the said superintendent shall at all times furnish to the board such information regarding the insane in his charge as they may request.

SECT. 36. To meet the expenses imposed upon the commission by the foregoing sections, the sum of twelve hundred dollars, or so much thereof as may be required, is annually appropriated; and the expenditures shall be audited by the governor and council.

BY-LAWS

OF THE NEW HAMPSHIRE ASYLUM FOR THE INSANE,
ADOPTED BY THE TRUSTEES AT A MEETING OF THEIR
BOARD HOLDEN OCTOBER 31, 1878, WITH SUBSEQUENT
AMENDMENTS.

SECTION 1. The annual meeting of the board of trustees shall be holden at the asylum, in Concord, on the third Thursday of November of each year, and a semi-annual meeting shall be held on the third Thursday of May of each year.

SECT. 2. The trustees shall, at the annual meeting, elect by ballot a president, secretary, and treasurer, who shall hold their respective offices one year, and until others are chosen in their stead. At times, when either of said offices is vacant, it may be filled at a special meeting of the trustees duly called for that purpose.

SECT. 3. Notice of the annual and semi-annual meetings shall be given by the secretary to each trustee, either verbally or by mail, at least fourteen days previous to the day of meeting; and any meeting may be continued by adjournment, from time to time, until the business thereof shall be completed. In case of omission to notify the annual meeting, the same shall not be lost, but shall be considered as adjourned for the transaction of business, until the required notice thereof shall be given, which the secretary shall forthwith proceed to give.

SECT. 4. The president, or any four of the trustees, may call a special meeting of the trustees whenever in the opinion of either it may be deemed expedient so to do; and the same

notice shall be given of a special as of the annual meeting, which notice shall state specifically the business to be brought before such meeting. In case of a vacancy in the office of secretary, the president shall notify the annual meeting.

SECT. 5. A majority of the members of the board shall constitute a quorum for the transaction of any business; but any less number, at a meeting duly called, may adjourn from time to time until a quorum be obtained.

SECT. 6. Two of the trustees shall visit the asylum each month; and notices of the months by him selected, or to him assigned, shall be sent to each member by the superintendent before the first day of such month.

SECT. 7. No trustee shall receive any compensation for his services as trustee; but expenses necessarily incurred in rendering the same shall be paid by the asylum.

SECT. 8. The trustees shall, at each annual meeting, appoint from their number an auditor, whose duty it shall be to examine the books and audit the accounts of the treasurer and of the financial agent for the ensuing year, and make a written report to the board, at their annual meeting.

SECT. 9. The treasurer shall give a bond, acceptable to the trustees, in the penal sum of fifteen thousand dollars, for the faithful performance of his duties for and during such time as he shall continue to hold the office of treasurer, which bond shall be deposited with the president of the board.

SECT. 10. The treasurer shall receive, hold, and disburse all moneys coming to the asylum, except the permanent funds and the income thereof. He shall make an exhibit of the state of his books, and of the property in his custody, when called for by the trustees. He shall make up his accounts to the 30th day of September, inclusive, in each year, which accounts, with his report thereon, shall be laid before the trustees at their annual meeting. His books shall at all times be open to the examination of the trustees.

SECT. 11. The treasurer shall pay all bills approved by the superintendent, and, in addition thereto, such orders as

the superintendent may draw on him for the ordinary expenditures of the asylum, when said offices are held by different individuals.

SECT. 12. The treasurer shall receive such compensation for his services as the trustees may from time to time determine.

SECT. 13. The secretary shall attend all meetings of the board of trustees, and keep a record of their proceedings. He shall also prepare, or cause to be prepared, all documents, statements, and notices which may be ordered by the board, or by the president thereof.

SECT. 14. The secretary shall receive such compensation for his services as the trustees may from time to time determine.

SECT. 15. The board of trustees shall appoint a superintendent, who shall be a physician, and reside at the asylum. He shall have the entire control of the treatment and management of the patients; the power to appoint and discharge all persons employed in their care; and shall exercise a general supervision and direction of every department of the institution.

SECT. 16. The superintendent shall make a written report to the trustees, at their annual meeting, of the condition of the asylum and embracing such other topics as may have been suggested by the progress of the institution and the experience of the year.

SECT. 17. The superintendent shall receive for his services, in addition to furnished apartments, board, lights, and fuel for himself and family, such a salary as the trustees may from time to time determine.

SECT. 18. The superintendent shall furnish, to the acceptance of the trustees, a bond for the faithful performance of his duties in the penal sum of ten thousand dollars, which bond shall be kept by the president of the asylum.

SECT. 19. The superintendent shall appoint two assistant physicians, who shall reside at the asylum. They shall pos-

sess such characters and qualifications as will enable them to discharge the ordinary duties of the superintendent, and shall at all times perform such duties as he may assign them, and to his acceptance.

SECT. 20. The assistant physicians shall receive such compensation for their services as the trustees may from time to time determine, in addition to furnished apartments, lights, fuel, and board.

SECT. 21. All funds amounting to one hundred dollars and upwards, which have heretofore been or which may hereafter be given to the New Hampshire Asylum for the Insane, shall, unless otherwise ordered by the donors, be entered upon the books of the financial agent as permanent funds, with the surnames of the donors attached to each, and be forever kept intact. The income of each shall be expended from time to time in accordance with the conditions upon which it was given, or, in the absence of conditions, in such manner as the trustees shall deem to be for the highest interest of the asylum and its patients.

SECT. 22. There shall be chosen, by ballot, a financial agent, who shall have charge of the permanent funds of the asylum, shall collect, and, under the advice of the finance committee, from time to time invest, manage, and disburse any moneys arising therefrom. He shall be, *ex officio*, a member of the finance committee, shall give a satisfactory bond for the faithful performance of his trust in the sum of twenty-five thousand dollars, and continue in office until his successor is elected. He shall receive for his services such compensation as the trustees shall from time to time determine, and make up his accounts to the thirtieth day of September inclusive of each year.

SECT. 23. The trustees shall annually choose two from their board, who, with the financial agent, shall constitute a finance committee, and have general supervision and control of the permanent funds of the asylum, with power to sell and transfer any stocks, bonds, and other securities belonging to

said funds, whenever, in their judgment, it may be expedient so to do.

SECT. 24. Besides attending the annual meeting, the trustees shall severally visit the asylum twice each year, in such months as they may select, or as may be assigned to them; make a thorough examination of the house and of the condition of the patients; and, before leaving, make a record of their respective visits in a book to be kept at the asylum for that purpose.

SECT. 25. These by-laws may be altered or amended at any annual meeting by a vote of two thirds of the trustees present, or at a special meeting called for that purpose.

NEW HAMPSHIRE ASYLUM

TRAINING SCHOOL FOR NURSES.

The trustees of the New Hampshire asylum having established a training school for nurses at that institution, offer to give women desirous of becoming professional nurses, a two years' course of training in general nursing, with especial reference to the care of cases of nervous and mental disease.

Those wishing to receive such instruction must apply to Dr. C. P. Bancroft, superintendent of New Hampshire Asylum, Concord, N. H.

The most desirable age for candidates is from twenty to thirty-five years. They must be in sound health, and sufficiently interested in the subject of nursing and free from all incumbrances so that they can, in all reasonable probability, complete the prescribed course of two years.

The superintendent of nurses has the immediate charge of the training school under the authority of the superintendent of the asylum, and the nurses are subject to the rules of the asylum. The right is reserved to terminate the connection of any nurse or pupil with the school for any reason which may be deemed sufficient.

All nurses are required to be intelligent, trustworthy, kind, and cheerful.

The instruction includes the general care of the sick, the making of beds, changing bed and body linen, managing of helpless patients in bed, etc., giving baths, keeping patients warm or cool, prevention and dressing of bed sores, and the

proper management of patients under various conditions of disease; the making and applying of bandages; the dispensing of drugs; the management of patients in accidents and emergencies; the application of poultices, the dressing of burns, ulcers, and wounds; the administering of enemata, and the use of the female catheter.

A course in cooking for the sick will be given by a competent instructor from the Boston Cooking School. Instruction will be given by the superintendent of nurses, by the medical staff at the asylum, and by physicians and surgeons resident in the city.

Students in the training school act as nurses in the various wards of the asylum, during their term of service. During the first year they receive from \$3 to \$3.50 per week; during the second year, from \$3.50 to \$4 per week.

When the full term of two years is completed, the nurses receive, if they pass all the examinations and their service in the asylum has been satisfactory, a diploma, certifying to the completion of the regular training and practice. Nurses who have served the full course in this asylum have found ready engagement as head nurses in the asylum, with wages of \$20 to \$25 per month, or as private nurses outside, at from \$10 to \$15 per week.

Nurses are required to wear at all times while on duty in the wards, the training school uniform.

The school begins in the fall, but accepted candidates may enter at any time, as vacancies occur. They are, as a rule, received in the order of their application.

QUESTIONS TO BE ANSWERED BY CANDIDATES.

1. Name in full of candidate.
2. Are you married, single, or widow?
3. Your present occupation or employment.
4. Age last birth-day, date and place of birth.
5. Are you strong and healthy?
6. Height? Weight?
7. Are you free from domestic or other responsibility so that you are not liable to be called away?
8. Name of any responsible person for reference.
9. Have you ever served in any other asylum or hospital, and if so, when and where?

Having read and clearly understanding and agreeing to the foregoing conditions and regulations, I declare the above statement to be correct.

(Signed)

Present address,

Date, 189 .

SERVICE MANUAL.

A strict observance of the following rules is the established condition of all contracts for service with the New Hampshire Asylum for the Insane; and any applicant for a position, not willing to observe them strictly, will do better to seek employment elsewhere.

1. Any employé wishing to leave the premises to go into the city or elsewhere must apply at the office, that such absence may be understood; and all must be at the asylum at 9.30 o'clock in the evening, unless away later by permission.

2. It is expected that all persons employed will consider that, on the conditions of their respective contracts, they have engaged their time and best services to the asylum; that it is inconsistent with their duties to hold any political office; that they are under obligations to do every duty assigned them, promptly and faithfully; that they will feel personally interested in the good care, safety, and welfare of the patients; and that they will give their personal influence in support of good order and the established regulations of the institution. To this end it is most desirable that all should cultivate quiet, kind, and dignified manners and correct habits in all things, considering always that this is no less for the interest of the employé than for that of the employer.

3. Those proposing to discontinue their services will give at least thirty days' notice, that time may be given to supply their places.

4. That the house may be quiet, it is expected that all will be at their own rooms after 9.30 o'clock in the evening, at which time the house is closed for the night. After this time

the quiet of the house must not be disturbed by passing and conversation. All must bear in mind that the repose of the patients is a thing of prime importance. All having duties must rise at the morning bell and proceed to the performance of the same.

5. No light must be carried about the buildings except in a lantern, and the greatest care must be taken in the use of matches that none be left exposed. A little carelessness in this thing might be followed with the most serious consequences. No smoking will be allowed on the asylum premises, except in the smoking-room provided for that purpose.

6. No one will invite visitors to stop in the house without permission to do so; but on application all reasonable privileges will be granted.

7. No one shall employ a patient to do private work for himself or herself without the consent of the superintendent, assistant superintendent, or other officer authorized to give such permission; and no one is allowed to trade or make bargains with patients.

8. Provision is made to afford each person employed a vacation of two weeks in the year, during which time the duties of the position will be done by a substitute; but the superintendent does not guarantee to retain the place of any one for a longer term of absence. On leaving for a vacation, or permanently, every one will deliver his or her keys at the office.

9. Whenever patients are encouraged to engage in any kind of labor, it is with a view to their own benefit; and hence no one will be taken from the halls for that purpose unless some order to that effect has been given in the case.

10. The person taking patients to labor will be held strictly responsible for their safety, kind care, and safe return to their respective halls.

11. All farmers or others to whom patients are intrusted for labor will remember that they are not to be treated as servants; they will avoid all appearance of commanding, and

will exercise the greatest care that no willing one shall be made a drudge or work too long. It will be treated as a grave offence if any employé shall take advantage of the willingness or mental weakness of any patient to impose on such one the harder or more unpleasant parts of the work on which they are employed. The head farmer is required to see that this rule is obeyed in spirit and letter, and report promptly to the superintendent any violation of the same. As occupation is a thing of the greatest value to most patients, every employé is required to do all in his or her power to interest them in it in some form, and make it attractive.

As far as practicable, provision will be made to give each employé opportunity to be absent from duty for church services on Sunday a due proportion of the time; and any whose ordinary labor is wholly suspended on Sunday are liable to be called on to relieve others, whose duties continue, a portion of the time, and such must hold themselves in readiness to be so called on. It is expected that all employés, whose duties do not interfere, will be present at the regular Sunday service in the chapel.

STEWARD.

The steward will have the general oversight of the buildings, farm, stock, and premises. It will be his duty to attend to ordinary business transactions, and see that asylum property in every department is saved, kept in its proper place, protected from harm or waste, and properly used. He will see that everything about the premises is kept in good order, that the grounds near the house are kept clean, free from waste and rubbish, and will extend the same supervision to the basement and attics, and see that the person to whom it is assigned to care for these spaces discharges his duty faithfully. He will see that all animals are properly taken care of, and that carriages, tools, and implements are kept in repair, and stored in their places when not in use; and, generally, he will be responsible to the superintendent for the good condi-

tion of property and premises, and must properly notify him of anything adverse to the welfare of the asylum which comes to his knowledge. He will attend to procuring ordinary supplies for subsistence, except so far as otherwise provided for by the superintendent, and see that such goods are delivered and stored in their proper places. He will see that the house is closed and the doors locked at the appointed hour at night, and hold himself ready to discharge any special duty required by the superintendent.

CLERK.

It will be the duty of the clerk to keep the books and accounts in a neat and accurate manner, take systematic care of all papers connected therewith, and perform any special clerical work required by the superintendent.

HOUSEKEEPER.

SECTION 1. The housekeeper will have the general management of the internal domestic affairs. The labor in the kitchen, laundry, and sewing department will be done under her direction; and those employed in these departments will hold themselves subject to her orders in the discharge of their duties. She will attend to the good condition of all apartments connected with the general housekeeping, will see that they are properly furnished and kept in good order. She will see that all the work in her departments is done in accordance with the general instructions of the superintendent.

SECT. 2. She will have the care of all goods and material used in her department, and will see that they are saved and economically used; all bedding and articles manufactured for housekeeping purposes will be under her care, and she must see that they are not wasted or given out needlessly. She will have the care of the making of any clothing furnished to female patients, and will be required to keep an accurate account of the cost of such clothing or other articles furnished

to any one. The cost of any articles furnished for patients must be returned by her to the supervisor, to be entered in the accounts of such patients.

SECT. 3. It is the duty of the housekeeper to report to the superintendent any instance of misconduct, failure in the proper discharge of duty, or violation of the established regulations occurring in her department, and not promptly rectified by the delinquent. It will also be her duty to report to the person who keeps the time-book the times of commencing and leaving duty of all employed in her department.

SUPERVISORS.

SECTION 1. The supervisors in their respective departments will have the general oversight of the halls and the patients; and the prudence and tact with which their duties are performed will be an important factor in the condition of the house. It is expected that they will see that the rules of the house relating to the patients are observed in every particular; that all patients are treated with uniform respect and kindness; and it is their imperative duty to report immediately to the superintendent or assistant superintendent any instance of neglect, incivility, or ill usage of a patient, or any violation of the established rules. .

SECT. 2. They will see that all medicines prescribed are faithfully and in a proper manner administered, and that all directions of the medical officers are strictly obeyed.

SECT. 3. They will be expected to pass as much time in the halls as the proper discharge of other duties will allow, will instruct new attendants in their duties, and as much as possible assist in efforts to interest and employ the patients.

SECT. 4. The supervisors must see that the dining-rooms are furnished with the necessary utensils, that the attendants take proper care of the dining-rooms, that the cupboards are sweet and in order, the tables neatly set, and the meals properly served.

SECT. 5. They will have the general charge of the cloth-

ing of the patients, and an oversight of the beds and bedding of the halls. The attendants must report to them any deficiency in either which may exist, and it is their duty to see that such wants are supplied.

SECT. 6. On the admission of patients, their clothing will be taken in charge by the supervisors, entered in the book provided for the purpose, and each article plainly marked. All articles afterwards furnished or received will be cared for in the same manner.

The clothing of patients leaving must be compared with the record, neatly packed, and delivered at the office by the appropriate supervisor.

Any knives, razors, or other dangerous article in possession of a patient on admission must be brought to the office for safe-keeping and record.

SECT. 7. They will pay special attention to the sick, report promptly at the office any change of symptoms, see that they have proper attention, and that any special diet prescribed is delicately prepared and served.

SECT. 8. After passing through the halls and learning the condition of the patients early in the morning, the supervisors will very briefly report to the physicians any sickness or other fact demanding attention before these morning visits.

SECT. 9. Before the Sunday chapel service, and other occasions of public gathering, the supervisors will see that the patients are properly dressed for the occasion, and accompanied to the chapel by their attendants.

SECT. 10. The supervisors will report to the clerk the times of commencing and leaving off work on the part of the attendants employed in their respective departments.

SECT. 11. In general, the supervisors are expected to hold themselves in readiness to carry into practical effect the instructions of the superintendent, and to use all their personal influence in support of the spirit and design of these regulations.

ATTENDANTS.

SECTION 1. In all their intercourse with the patients, the attendants are required to treat them with respect and civility, to be kind and gentle in manner, and avoid roughness of every kind. They must answer, as far as they can, the civil questions of a patient, and attend to every reasonable request. They must be calm and quiet under provocation, never scold, threaten, or recriminate, and make every request in a respectful manner.

SECT. 2. In the care of the insane, sympathy, kindness, and tact should take the place of force and display of authority. But if at any time the use of force becomes a necessity, the *manner* of using it should take away its offensiveness; and *force* should never be resorted to without the presence of sufficient assistance to render a violent struggle unnecessary.

SECT. 3. A cheerful look, a kind manner, a respectful demeanor, and expressions of sympathy will do much to quiet the excited and give the attendant influence and easy control over patients, and render duty easy and agreeable.

SECT. 4. The opposition which the insane make often arises from delusions that lead them to believe they are to be injured in some way, and for this reason every effort to control them to administer food; medicine, or baths, or to do anything for them, should be made in the most kind and delicate manner, that their confidence may be secured and retained. On the other hand, cross words, angry looks, or violent acts destroy their confidence and diminish their chances of recovery. No one must risk the consequences of such measures.

SECT. 5. A blow or a kick is never to be inflicted on a patient by any employé under any circumstances. Any violation of this rule will be treated as a grave offence.

SECT. 6. Mechanical restraint must never be put on a patient without the authority of a medical officer.

SECT. 7. The attendant should be an example of good manners, avoiding all rude and ungentlemanly or unladylike

habits not suited to the well-ordered household. They should treat each other and all with civility and politeness, cherish a high sense of obligation, and never forget the golden rule, to do by others as, in changed circumstances, one would wish to be done by. By this simple means the attendant is sure to gain not only self-respect, but an easy control and personal influence.

SECT. 8. Attendants should hear with patience, and answer with caution; should never promise what cannot safely be performed, and having made a promise, be faithful in its execution.

SECT. 9. The peculiarities of patients must never be made a subject of sport or ridicule, but, rather, withheld from publicity, with tender regard for their feelings and welfare.

SECT. 10. The attendants must rise at the ringing of the morning bell, and at once commence the labors of the day. On opening the sleeping-rooms of the patients, they shall greet the occupants with expressions of kindness, see that they rise (if able), are properly dressed, washed, and prepared for breakfast at the appointed hour.

SECT. 11. As soon as practicable after the patients have arisen from bed, the attendants must see that the night vessels are removed from the rooms and the beds are thrown open for airing; and as soon as other duties will allow, they will remove all soiled bedding, and see that the beds are put in good order.

SECT. 12. Immediately after breakfast the halls and patients' rooms must be made clean and put in good order, and so kept at all times. Scrupulous care must be given to the water-closets, which will require frequent rinsing with hot water, and the use of disinfectants. The same care must be taken of the wash-bowls, and a sufficiency of clean towels must be at hand, as well as combs and brushes for the hair.

The attendants will follow the same rule of cleanliness in the care of the halls, windows, spaces, back-stairs, and dining-rooms, never being satisfied until they are as clean as

they can be made. Patients able and willing to assist in these labors are to be encouraged to do so, *but never compelled to work*. The attendants are held responsible for the complete execution of these requirements.

SECT. 13. The attendants will ever be watchful of the state of the atmosphere in the halls, and report to the office any evidence of impurity which is beyond their power to correct otherwise.

SECT. 14. The attendants must see that clean linen is put on each bed once in every week, and oftener if necessary; and if a sufficient supply of this or of towels is not at hand, the fact must be promptly reported to the supervisor.

SECT. 15. The attendants must see that the tables are properly laid, that everything about them is perfectly clean, and that they are made as inviting as practicable. During meals the attendants must always be present and wait on the table in a respectful and delicate manner, such as they would be willing to have adopted toward themselves under like circumstances. *Patients must not be hurried through their meals*, to hasten the clearing of the table. The attendants must use special care that no knife, fork, or other article is carried from the table by any patient.

SECT. 16. It is obviously improper for the attendants, after the hall work is done, to retire to their own rooms and leave the patients alone during hours of duty. Their time and attention are due to the patients, and must be devoted to keeping them quiet and tidy, preventing improper conduct of every sort, or lapsing into listlessness and torpor to efforts to preserve their self-respect, and to carry into effect the general direction of the physicians. These ends are to be sought by efforts to keep patients occupied, either in work, reading, games, or judicious social intercourse.

SECT. 17. Visiting from hall to hall during hours of duty, without special business, or going away to other parts of the premises out of one's field of service, is wholly improper, and not allowed.

SECT. 18. The attendants are expected to know how every patient in their charge is employed, and to be vigilant, by every means in their power, to better the condition of every one.

SECT. 19. The attendants must not allow a patient to be taken from the halls by any one employed in other departments unless a general or special permission from a medical officer to that effect has been given; nor will the patients leave the halls before breakfast or on Sunday without the same permission.

SECT. 20. The attendants must always be alive to the welfare of those in their charge, and in the night hold themselves ready to arise and assist the night attendant if the condition of a patient requires it. They will come to the office for medicines or instructions when needed, and follow all directions carefully. After giving medicines, they should wash and return the glasses *at once*.

SECT. 21. If damage is done to buildings or property, by patients, the attendants will report it to their supervisor.

SECT. 22. The attendants are never to give up their keys except at the office, on leaving; nor are they ever to admit strangers into the halls without special permission.

SECT. 23. *The attendants will always take care that the clothing worn by patients is adapted to the season and the occasion. In case of sudden change from heat to cold, they must make at once the needed change in clothing.*

SECT. 24. It is particularly expected of attendants to see that every patient is cleanly in person, that the hair and nails are attended to, that any rent in clothing is properly mended, that the garments worn are kept buttoned or hooked, and that any stains from carelessness in eating are promptly removed. Each attendant should keep at hand a sponge and soap, and a small stock of sewing utensils, as needles, thread, buttons, hooks and eyes, etc., for immediate use when needed.

SECT. 25. When the physicians visit the halls, one of the attendants must be on hand to give any information required,

to accompany them to any patient's room, or render any other assistance needed.

SECT. 26. Each patient will take a warm bath each week, unless made an exception by direction of the physician. In particular cases of weakness or special delicacy, the sponge bath may be substituted for the tub. In such cases, as well as those who may desire to bathe more frequently, the attendant should apply to the attending physician for specific directions. The attendants must superintend the baths of patients, and not leave the halls with the bath-rooms open (unless exceptions are made); and in no case must an epileptic or suicidal patient bathe without the presence of an attendant.

SECT. 27. In suitable weather all patients who are able will go out for exercise, accompanied by their respective attendants, on such conditions as shall from time to time be prescribed. In these outdoor exercises the attendants must see that no one strays from the party, and so regulate the speed of walking or the character of other exercise as to suit, as well as may be, the average of persons present. They must try to avoid all appearance of restraint, and seek to make these occasions as enjoyable as possible. Preference should be given to walks within the asylum grounds; but when walks are taken into the city, it is not permitted to visit stores, hotels, railroad stations, or other public places, except by permission previously obtained.

In the airing-courts the same rules for the care of patients will be observed as apply to the halls. The attendants must not allow any rubbish to accumulate on the ground of the courts.

SECT. 28. The attendants must shave those patients who do not desire to wear a beard. In shaving, great care must be taken to have the razor in good order, and to shave easily and neatly. No other patient should be present; and the razors must be kept under lock and key in the attendant's room.

SECT. 29. The attendants, in their respective halls, will

strictly observe the instructions of the superintendent in regard to the time for the patients' retiring; and in assisting them to bed they must practice the same delicacy and courtesy enjoined elsewhere in these rules. Before closing the doors for the night they must see that the patients are comfortably in bed; *and it is especially enjoined* that they offer gentle and patient assistance to the feeble and aged, and leave all with a kind "good night."

NIGHT ATTENDANTS.

SECTION 1. The night attendants will visit the office at eight o'clock in the evening, to receive their instructions for the night and go on duty at once. They will continue in charge of their respective sections of the house until after the ringing of the rising-bell, at the times established, after which they will be relieved by the attendants. They must be always awake, vigilant, and faithful, giving their whole attention to the condition of the house and patients. They must make their respective rounds, not hastily, thus leaving a large part of the time to be spent at the office, but dividing it between the various apartments as directed. They must pass through the halls in the most quiet manner, being especially careful in opening and closing doors, and make the personal observations required with the most respectful delicacy, disturbing the patient as little as possible. They must be especially watchful of the sick, minister tenderly to their wants, carry out scrupulously all instructions in regard to them, and report to a physician any unfavorable change of condition. They must promptly attend to the call of patients, ascertain their wants, and satisfy them, if practicable. They must do all in their power to soothe and quiet any who may be wakeful or timid, and assure them of their safety.

SECT. 2. They must be especially vigilant in the care of those inclining to suicide or self-injury, and neglect no effort to be assured of the safety of such, in accordance with the specific directions they receive in each case.

SECT. 3. They must be always watchful in regard to fire; and, if it occurs, must at once, and in the most quiet manner, inform the officers and employés, without a general alarm, and proceed to extinguish it. They must frequently inspect the attics of their respective departments, and see that the iron doors are kept shut. The safety, the comfort, and the lives of large numbers are intrusted, in a great measure, to the night attendants; and a degree of vigilance and faithfulness corresponding to the magnitude of the interests at stake is expected of them in the execution of all instructions given them.

SECT. 4. It is the imperative duty of the night attendants to report any irregularity or violation of the rules of the house which may come to their knowledge to the superintendent, and not to make the same a subject of remark elsewhere.

SECT. 5. During public services in the chapel on Sunday, and on other occasions, it is made the duty of the night attendants to look to the condition of the halls in the absence of the attendants.

COOK.

Under the direction of the matron, the cook will have the supervision of the work in the kitchen, the care of utensils, and of supplies of provisions within the kitchen premises.

The cook must see that the kitchen and all utensils are kept clean and in perfect order, that good order is preserved in the kitchen, and that each employé performs all duties assigned in a proper manner.

The cook shall see that all food is prepared as directed, is made palatable and inviting, and sent to the halls hot. Special care must be taken in preparing messes for the sick, that they are nicely cooked, and sent to the patients in acceptable form.

The cook will report to the matron any instance of failure in duty or violation of the rules occurring in the department.

Persons employed elsewhere in the institution will not be allowed to loiter about the kitchen premises or bakery.

If any meat, butter, or other articles of food, of poor quality, are furnished for use, the head cook must promptly report it to the steward or superintendent.

BAKER.

The baker will see that the baking-room, oven, and all utensils belonging to his department are kept scrupulously clean at all times, that the house is kept supplied with the various kinds of bread prescribed, and he must keep his stock of bread sufficiently in advance of the demand that it may not be eaten absolutely new. On the mornings designated, he will make warm rolls or biscuit in season for breakfast.

It is his duty to report at once to the superintendent or steward any defect he may discover in the quality of the flour, or other material for food furnished to his department.

PORTER.

The porter will have the whole charge of the food car, and will keep it always clean and in good order; will, at the appointed times, take the prepared meals from the kitchen to the several dumb-waiters, and deliver them to the attendants, who shall be present at the call of the slide-bell, assist the porter in running up the dumb-waiter, if necessary, and remove the meals carefully to the dining-rooms. In this, care must be taken by all that the food and utensils are handled gently, and that the meals reach the tables in good order. In like manner must the dishes and slops be received from the attendants by the porter, and by him be properly disposed of.

The porter will be responsible for keeping the basement and attics swept, and everything in its place. It is also his duty to fill the underbeds for the female attendants, great care being taken that the sacks be not soiled in the process. He will also remove the discarded beds each morning to the place designated. At the appointed times the porter will attend to the delivery of ice to the hall attendants and others, according

to instructions of the superintendent. He will see that any objects thrown from the windows during the night are removed promptly in the morning, and will hold himself ready to perform any item of duty required by the superintendent.

ENGINEER.

The engineer will be responsible for the good care of the boilers, engine, steam and water pumps, and all parts of the machinery, which must be kept in repair and in good running order. He shall promptly attend to the repairs needed in steam or water apparatus or other repairs or alterations assigned to him. It will be his duty to see that the boilers are properly fired, and the fuel used in the most economical and efficient manner. He will see that the radiators, air-chambers, and flues are properly adjusted for heat and ventilation, and that the amount of steam generated is wisely adapted to the state of the weather. It will be his duty in summer to attend to all needed alterations and repairs in steam-heating apparatus, preparatory to the demands of winter.

He must at all times be so thoroughly familiar with the location and condition of all hydrants, hose, or water-cocks provided for the extinguishing of fire, that he can put them in operation instantly, if needed. He will also be expected to hold himself in readiness to attend to any special duty required by the superintendent.

FARMER.

The head farmer will have the immediate supervision of the farm laborers, the laying out of the work, and the direction of the care and use of the stock and farming utensils; and all farm laborers will look to him for specific directions as to their duties.

It is his duty to see that all farm fences are kept in repair, and that everything on the farm and about the farm buildings is kept in perfect order, that the stock is well cared for, that

every farmer performs his duty well, and that all material is properly and economically used. He will report to the clerk the time of service of each person in his department, and to the superintendent any fault or failure in duty on the part of any under his charge.

SUCCESSION OF OFFICERS.

TRUSTEES.

Commissioned.	Name.	Residence.
1840, June 20.	Daniel Abbott,	Nashua.
June 20.	Amos Twitchell,	Keene.
June 20.	Ichabod Bartlett,	Portsmouth.
June 20.	John Conant,	Jaffrey.
June 20.	Joseph Low,	Concord.
June 20.	Charles H. Peaslee,	Concord.
June 20.	Ira St. Clair,	Deerfield.
June 20.	Charles A. Cheever,	Portsmouth.
June 20.	John P. Hale,	Dover.
June 20.	Charles J. Fox,	Nashville.
June 20.	Samuel Swasey,	Haverhill.
June 20.	John S. Wells,	Lancaster.
1841, June 15.	Enos Stevens,	Charlestown.
June 15.	George W. Kittredge,	Newmarket.
June 15.	Joseph Low, reappointed,	Concord.
1843, June 19.	Moses Norris, Jr.,	Pittsfield.
June 19.	Ira St. Clair, reappointed,	Deerfield.
June 19.	Charles J. Fox, reappointed,	Nashville.
1845, June 30.	Abiel Walker, <i>vice</i> Joseph Low,	Concord.
June 30.	A. McFarland, <i>vice</i> G. W. Kittredge,	Meredith.
June 30.	Timothy Hall, <i>vice</i> Enos Stevens,	Keene.
June 30.	Luke Woodbury, <i>vice</i> C. J. Fox,	Antrim.
June 30.	Wm. Plumer, Jr., <i>vice</i> S. E. Coues,	Epping.
Dec. 23.	James Farrington, <i>vice</i> A. McFarland,	Rochester.
1846, July 10.	Nathaniel S. Berry,	Hebron.

1846,	July 10.	George B. Upham,	Claremont.
	July 10.	William Plumer,	Londonderry.
1847,	Aug. 9.	Jos. B. Walker, <i>vice</i> A. Walker,	Concord.
	Aug. 9.	Israel Hunt, Jr.,	Nashua.
	Aug. 9.	Warren Lovell,	Meredith.
	Aug. 9.	Thomas Shannon,	Moultonborough.
1848,	June 26.	Wm. Plumer, reappointed,	Epping.
	June 26.	Franklin Pierce,	Concord.
	June 26.	R. Metcalf, <i>vice</i> G. B. Upham,	Newport.
	June 26.	Charles H. Peaslee, reappointed,	Concord.
1849,	July 3.	Joseph B. Walker, reappointed,	Concord.
	July 3.	Joseph H. Smith,	Dover.
	July 3.	Amos A. Parker,	Fitzwilliam.
1850,	July 5.	Ralph Metcalf, reappointed,	Newport.
	July 5.	Isaac Ross, <i>vice</i> N. S. Berry,	Hanover.
	July 5.	David Pillsbury, <i>vice</i> William Plumer,	Chester.
1851,	July 4.	Charles Burroughs, <i>vice</i> T. Shannon,	Portsmouth.
	July 4.	Israel Hunt, reappointed,	Nashua.
	July 4.	Warren Lovell, “	Laconia.
1852,	June 19.	Franklin Pierce, “	Concord.
	June 19.	Wm. Plumer, “	Epping.
	June 19.	Chas. H. Peaslee, “	Concord.
1853,	July 1.	Jos. B. Walker, “	Concord.
	July 1.	Jos. H. Smith, “	Dover.
	July 1.	Amos A. Parker, “	Fitzwilliam.
1854,	July 15.	Ralph Metcalf, “	Newport.
	July 15.	Samuel Herbert,	Rumney.
	July 15.	Enoch D. Yeaton,	Wakefield.
	Sept. 29.	J. A. Richardson, <i>vice</i> William Plumer,	Durham.
1855,	July 10.	Rufus Clement,	Concord.
	July 10.	Alvah Smith, <i>vice</i> Ralph Metcalf,	Lempster.
	July 10.	Chas. Burroughs, reappointed,	Portsmouth.
1856,	Feb. 23.	Timothy Haynes, <i>vice</i> R. Clement,	Concord.
	July 11.	John Preston,	New Ipswich.
	July 11.	Chas. H. Peaslee, reappointed,	Concord.
1857,	June 30.	George B. Twitchell,	Keene.

1857,	June 30.	Joseph B. Walker, reappointed,	Concord.
	June 30.	John H. White,	Lancaster.
1858,	June 26.	Jeremiah F. Hall,	Wolfeborough.
	June 26.	Ralph Metcalf, reappointed,	Newport.
	June 26.	Samuel Herbert, reappointed,	Rumney.
	Sept. 28.	Edward Wyman, <i>vice</i> R. Metcalf,	Newport.
	June 27.	Chas. Burroughs, reappointed,	Portsmouth.
1859,	June 28.	Timothy Haynes, reappointed,	Concord.
	June 27.	Woodbury Melcher,	Gilford.
1860,	June 27.	J. A. Richardson, reappointed,	Durham.
	June 27.	Chas. H. Peaslee, “	Concord.
	June 27.	John Preston, “	New Ipswich.
1861,	July 2.	Geo. B. Twitchell, “	Keene.
	July 2.	Joseph B. Walker, “	Concord.
	July 2.	John H. White, “	Lancaster.
1862,	July 2.	John Conant, “	Jaffrey.
	July 2.	Isaac Spalding,	Nashua.
	July 2.	Moses Clark,	Landaff.
1863,	June 29.	Charles W. Flanders,	Concord.
	June 29.	Chas. Burroughs, reappointed,	Portsmouth.
	June 29.	Woodbury Melcher, “	Laconia.
1864,	July 7.	Charles H. Peaslee, “	Concord.
	July 7.	John Preston, “	New Ipswich.
	July 7.	Wm. G. Perry,	Exeter.
1865,	July 16.	Geo. B. Twitchell, reappointed,	Keene.
	July 16.	Joseph B. Walker, reappointed,	Concord.
	July 16.	Denison R. Burnham,	Plymouth.
1866,	June 22.	Charles A. Tufts,	Dover.
	June 22.	John Conant, reappointed,	Jaffrey.
	June 22.	Isaac Spalding, reappointed,	Nashua.
	Oct. 23.	Isaac Adams, <i>vice</i> C. H. Peaslee,	Sandwich.
1867,	June 19.	Chas. Burroughs, reappointed,	Portsmouth.
	June 19.	Woodbury Melcher, reappointed,	Laconia.
	June 19.	Ebenezer S. Towle,	Concord.
1868,	April 13.	I. Goodwin, <i>vice</i> C. Burroughs,	Portsmouth.
	July 1.	Isaac Adams, reappointed,	Sandwich.
	July 1.	Waterman Smith,	Manchester.
	July 1.	Wm. G. Perry, reappointed,	Exeter.
	July 1.	Ebenezer S. Towle, “	Concord.

1869, July	1.	Joseph B. Walker, reappointed,	Concord.
July	1.	Geo. B. Twitchell, “	Keene.
July	1.	Denison R. Burnham, “	Plymouth.
1870, Jan.	3.	John W. Sanborn, <i>vice</i> Isaac Adams,	Wakefield.
July	8.	Isaac Spalding, reappointed,	Nashua.
July	8.	Charles A. Tufts, reappointed,	Dover.
July	8.	Dexter Richards,	Newport.
Nov. 17.		Ellery A. Hibbard, <i>vice</i> W. Melcher,	Laconia.
1871, Aug.	9.	Ellery A. Hibbard, reappointed,	Laconia.
Aug.	9.	George W. Haven,	Portsmouth.
Aug.	9.	Henry Colony,	Keene.
1872, July	16.	Waterman Smith, reappointed,	Manchester.
July	16.	Wm. G. Perry, “	Exeter.
July	16.	John W. Sanborn, “	Wakefield.
1873, Oct.	23.	Joseph B. Walker, “	Concord.
Oct.	23.	Geo. B. Twitchell, “	Keene.
Oct.	23.	Josiah Minot,	Concord.
1874, July	8.	Isaac Spalding, reappointed,	Nashua.
July	8.	Charles A. Tufts, “	Dover.
July	8.	Dexter Richards, “	Newport.
1875, July	26.	Ellery A. Hibbard, “	Laconia.
July	26.	Charles H. Bell,	Exeter.
July	26.	Albert Smith,	Peterborough.
1876, June	22.	David Gillis,	Nashua.
July	20.	William G. Perry, reappointed,	Exeter.
July	20.	Waterman Smith, “	Manchester.
July	20.	Joseph Burrows,	Plymouth.
Aug.	10.	John V. Barron, <i>vice</i> J. Minot,	Concord.
1877, Oct.	17.	Joseph B. Walker, reappointed,	Concord.
Oct.	17.	Geo. B. Twitchell, “	Keene.
Oct.	17.	John V. Barron, “	Concord.
1878, May	2.	John H. George, <i>vice</i> J. V. Barron,	Concord.
May	2.	Carlton P. Frost, <i>vice</i> A. Smith,	Hanover.
July	8.	Dexter Richards, reappointed,	Newport.
July	8.	Charles A. Tufts, “	Dover.
July	8.	David Gillis, “	Nashua.

1879, July 30.	Ellery A. Hibbard, reappointed,	Laconia.
July 30.	Jeremiah F. Hall,	Portsmouth.
Aug. 14.	Carlton P. Frost, reappointed,	Hanover.
1880, July 20.	William G. Perry, “	Exeter.
July 20.	Waterman Smith, “	Manchester.
July 20.	Joseph Burrows, “	Plymouth.
1881, Oct. 12.	Joseph B. Walker, “	Concord.
Oct. 12.	Geo. B. Twitchell, “	Keene.
Oct. 12.	John H. George, “	Concord.
1882, June 21.	Emery J. Randall,	Somersworth.
June 21.	Frederick E. Potter,	Portsmouth.
Sept. 22.	Dexter Richards, reappointed,	Newport.
1883, April 26.	William H. H. Mason, <i>vice</i> J. Burrows,	Moultonborough.
May 17.	Edward Spalding, <i>vice</i> F. E. Potter,	Nashua.
Aug. 28.	Ellery A. Hibbard, reappointed,	Laconia.
Aug. 28.	Carlton P. Frost, “	Hanover.
Aug. 28.	Jeremiah F. Hall, “	Portsmouth.
1884, July 25.	Wm. G. Perry, “	Exeter.
July 25.	Waterman Smith, “	Manchester.
July 25.	Wm. H. H. Mason, “	Moultonborough.
1885, Oct. 14.	Joseph B. Walker, “	Concord.
Oct. 14.	George B. Twitchell, “	Keene.
Oct. 14.	John H. George, “	Concord.
1886, Sept. 9.	Dexter Richards, “	Newport.
July 8.	Emery J. Randall, “	Somersworth.
July 8.	Edward Spalding, “	Nashua.
1887, Sept. 7.	Ellery A. Hibbard, “	Laconia.
Sept. 7.	Carlton P. Frost, “	Hanover.
Sept. 7.	Jeremiah F. Hall, “	Portsmouth.
1888, Mar. 6.	John E. Barry, <i>vice</i> John H. George, deceased,	Concord.
Mar. 6.	Franklin D. Ayer, <i>vice</i> J. F. Hall, deceased,	Concord.
July 24.	William G. Perry, reappointed,	Exeter.
July 24.	Waterman Smith, “	Manchester.
July 24.	Wm. H. H. Mason, “	Moultonborough.
1889, Oct. 14.	Joseph B. Walker,	Concord.

1889, Oct. 14.	George B. Twitchell,	Keene.
Oct. 14.	John E. Barry,	Concord.
1890, July 8.	Edward Spalding,	Nashua.
July 8.	Dexter Richards,	Newport.
July 8.	Morris Christie,	Antrim.
1891, Sept. 14.	Ellery A. Hibbard,	Laconia.
Sept. 14.	Carlton P. Frost,	Hanover.
Sept. 14.	Franklin D. Ayer,	Concord.

PRESIDENTS.

John H. Steele	1839-1840
John Conant	1840-1846
George B. Upham	1847-1848
William Plumer	1848-1855
Charles Burroughs	1855-1868
Isaac Spalding	1868-1875
George B. Twitchell	1875-

SECRETARIES.

Dixi Crosby	1839-1841
Charles H. Peaslee	1841-1848
Joseph B. Walker	1848-

TREASURERS.

James Thorn	1839-1840
Joseph Low	1840-1846
John Atwood	1846-1847
Andrew McFarland	1847-1852
John E. Tyler	1852-1857
Jesse P. Bancroft	1857-1890
Charles P. Bancroft	1890-

SUPERINTENDENTS.

George Chandler	1842-1845
Andrew McFarland	1845-1852
John E. Tyler	1852-1857
Jesse P. Bancroft	1857-1882
Charles P. Bancroft	1882-



TENTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF NEW HAMPSHIRE

FOR THE

YEAR ENDING OCTOBER 31, 1891.

CONCORD :

IRA C. EVANS, PUBLIC PRINTER.

1891.

STATE OF NEW HAMPSHIRE.

OFFICE OF THE STATE BOARD OF HEALTH,
STATE HOUSE, November 1, 1891.

*To His Excellency the Governor and the Honorable
Council:*

In conformity with the laws of the State of New Hampshire, I have the honor to present herewith the Tenth Annual Report of the State Board of Health, for the fiscal year ending October 31, 1891.

Respectfully submitted,

Irving A. Watson
Secretary.

MEMBERS OF THE BOARD.

Gov. HIRAM A. TUTTLE	.	.	.	Pittsfield.
ATT'Y-GEN. DANIEL BARNARD	.	.	.	Franklin.
HON. JAMES A. WESTON	.	.	.	Manchester.
G. P. CONN, M. D. <i>President</i>	.	.	.	Concord.
JOHN J. BERRY, M. D.	.	.	.	Portsmouth.
IRVING A. WATSON, M. D., <i>Secretary</i>	.	.	.	Concord.

GENERAL REPORT.

The tenth annual report of the State Board of Health is herewith presented. Its object, like that of its predecessors, is more to educate the public in hygienic and sanitary matters than to chronicle the special or particular work accomplished by this department, although enough of the latter is presented to give a general idea of what the Board has done during the year.

The excellent papers which this report contains cannot fail to give much valuable information to the people of the State, upon subjects vital to their continued prosperity. There is nothing that stands so relentlessly between man and the fruition of his hopes as sickness; nothing that depresses and discourages like ill health; nothing that clouds the future with an almost impenetrable gloom like the loss of family, and nothing so wasteful to the commonwealth as the ravages of preventable diseases. It is to lessen these and other evils that this Board has labored earnestly, and with a pleasing measure of success, for a single decade. The Board was organized in 1881. The action of the Legislature in creating it was looked upon at the time by some of our most intelligent citizens as a doubtful experiment. There were not a few, however, who believed a State Board of Health could become a branch of the public service second to none other in its ability to benefit the people of the State. It would savor of egotism to express an opinion as to how far this belief has been demonstrated. The record is to be found in part in the published reports of the Board, but to a greater extent in the sanitary advancement made during that period throughout the State. The more advanced and intelligent views held respecting the

prevention and restriction of contagious and infectious diseases; a comprehensive knowledge of the effect of unsanitary conditions upon health; the great danger arising from polluted water supplies, and insufficient drainage; a more general belief in the responsibility of environment for many of the diseases which afflict mankind, and many other once doubted facts, indicate that the people of the State are becoming educated in matters pertaining to health. The evidence of this is patent in nearly all our towns and cities. Improved systems of sewerage, increased water supplies, more complete isolation in contagious and infectious diseases, a greater number of local boards of health with a more thorough comprehension of their duties, are among the obvious evidences of an increasing knowledge of the means necessary to secure and maintain good health.

In less than a single generation the theory of sanitary science has become grounded in a mass of incontrovertible facts so apparent as to be recognized by every intelligent person and community. Twenty-two years ago the first state board of health in this country was established; to-day there are thirty-six state boards and one territorial board of health, while thousands of local boards have been organized. Such an onward march of sanitation could never have taken place, involving as it has the expenditure of hundreds of thousands of dollars, had it not been attended, directly or indirectly, with the most remunerative results to the public, and it is only when passively or inefficiently applied that disappointment and failure follow. Isolation and disinfection positively guarantee the suppression of contagious and infectious diseases if properly applied. Failure is not, therefore, chargeable to the means, but to the imperfect application. The same is equally true in the application of sanitation and hygiene to all the conditions and surroundings of life to which they bear any relation.

While the results of sanitary work have been most marked and the progress as rapid as the most sanguine could reasonably expect, we are still a considerable distance short of what

it is possible to attain. Until our death records show a vastly reduced mortality from consumption, diphtheria, scarlet fever, typhoid fever, and other preventable diseases, there must be maintained an unceasing and untiring effort, educational and executive, to accomplish the grand and beneficent results which sanitary science has made possible.

SANITATION AT OUR SUMMER RESORTS.

The sanitary condition of our summer resorts — hotels, boarding houses, parks, and even farm houses where summer boarders are taken — is, as a whole, most excellent. There has been during the past few years an increasing appreciation of the advantages of sanitation among the class who receive summer boarders. With this class it has become identified with full houses and financial prosperity—a lesson which should with equal force be impressed upon town and municipal administrations. The summer tourist is contributing to the prosperity of the State to a degree surpassed only, if at all, by the manufacturing and agricultural interests. Indeed, it may be truthfully said that but for the summer visitor, agriculture in New Hampshire would be at a much lower ebb than it is at the present time.

The average tourist has a wholesome fear of unsanitary conditions and unhygienic surroundings, and our State would not be the resort of the thousands who annually visit it if sanitation were not carefully and duly considered by those who entertain them at hotels and country homes. Large sums of money are annually expended to maintain and improve the sanitary conditions of our hotels, boarding and farm houses, for the special purpose of providing every essential to the comfort and good health of the visitor. This work is so effectively done that an outbreak of any disease traceable to defective drainage, polluted water or the like is remarkably rare among the tens of thousands that sojourn with us during the summer and autumn months. We have always maintained that the State should protect to its utmost ability the health of the summer visitor, and to that end we

have constantly sought to secure the most healthful environments at all places to which he is invited. The results have been of the most gratifying character. Many of those who have money invested at summer resorts fear an outbreak of any disease of a zymotic nature more than they do a fire, for such an occurrence means an injury to their business from which it would take a long time to recover; hence good sanitation, with constant watchfulness to maintain it, is their only insurance against loss from disease. To this fact may be attributed very largely the excellent sanitary conditions that characterize most of our summer resort hotels. Of course it is not to be asserted that there are no exceptions to this general statement, but it is a matter of state congratulation that they are so few.

With our grand mountains, the charming valleys, the beautiful lakes and streams, the invigorating atmosphere, delightful hotels and attractive farm houses, and good sanitation, we can welcome the constantly increasing thousands to our State with every reasonable assurance that the chief objects for which they come — health, recreation, and happiness — will be secured.

LOCAL BOARDS OF HEALTH.

Legally, every town in the State has a board of health or a health officer, by virtue of the law that makes the board of selectmen a board of health if none other is elected or appointed; but as an actual fact, many of the smaller towns have no active board. In only a very few towns do the selectmen make efficient health officers. They are elected wholly for the purpose of administering the business and financial affairs of the town, without regard to any qualifications as health officers, and they not infrequently know little or nothing of the duties pertaining to the latter office. This is not as it should be. There is no town in the State, however small, that may not be benefited by the wise and intelligent work, instructions, and recommendations of a well qualified health officer or board of health. The law provides

that the selectmen may appoint health officers when none are elected, but that they shall appoint if so petitioned by ten legal voters. In some towns the selectmen, recognizing the importance of the office, appoint without delay; in others a petition has been necessary to secure the appointment; while in a larger number of instances no action whatever is taken. However, there are a good number of local boards of health in the State doing valuable and efficient work for their respective towns, and among this number are a few boards of selectmen than whom no better health officers could be found. Nevertheless, the average board of selectmen does not make a competent board of health, and we would recommend that the law be so changed as to require in the smaller towns the appointment of a well qualified person to act as health officer, and a board of health in the larger towns. We believe such action would improve the public health service of the State.

The aggregate amount of work accomplished by local health officers throughout the State is very great, and is of incomparable benefit to the commonwealth. The progress in this direction from year to year is one of the tangible proofs of an increasing public recognition of the value of sanitation to public and private interests.

WATER SUPPLIES.

Until within a comparatively recent period a public water supply, from an ample source, distributed by means of pipes, and for which a reasonable annual charge should be made, was thought to be impracticable and unprofitable, except in the cities. Even the larger towns, like Rochester (now a city), Laconia, Lebanon, Littleton, Claremont, Lisbon, and others, until recently had no system of water-works that could be called a public supply. These towns, as well as nearly every village in the State, depended almost wholly upon wells for water for domestic uses. Ten years ago this Board commenced the work of pointing out to the public the manifest dangers lurking in the wells of a settled community, or

in any locality where soil pollution exists, and the work has been continued to the present time. Diseases due to contaminated water have been repeatedly shown up in our annual reports. The analysis of the water in hundreds of wells in the State have proven the truth of the doctrine taught, until the public mind has become thoroughly convinced upon this exceedingly important subject. As a result of a more general and wide-spread knowledge of the dangers arising from the use of contaminated well waters, there has come to be a demand for water for domestic purposes from sources free from the dangers alluded to; hence a great many of our villages are now supplied with good water at a reasonable and moderate cost to the taker. The list of the towns thus supplied is a long one and is increasing yearly. At each session of the Legislature charters for new water-works are granted. The direct result of a better water supply has been manifested in every place that has been fortunate enough to secure this great public improvement.

SEWERS.

Not less important than an ample supply of pure water is a good system of sewers for every village and city. A polluted and sewage-soaked soil is as dangerous a condition as can surround a home. This fact is well recognized, at least by the more intelligent citizen, and each year witnesses many improvements in this direction. Many of our towns and cities have expended during the year no insignificant amount of money in the extension of sewer systems already commenced or in the construction of new ones. Among the latter, and also the most notable, is that of Laconia. This enterprising and growing town recently constructed a splendid system of water-works, and the need of a complete system of sewers immediately became most urgent. At the last town meeting an ample appropriation was voted for the purpose, and the system is now nearly completed. This work will be of incalculable benefit to the town. Nashua, Manchester, Concord, Dover, and Claremont are among the

places that have expended considerable money in extending their sewers. Many of the smaller towns have built sewers in their more thickly settled portions, and will extend them as rapidly as the demand and a prudent expenditure of the public money will warrant.

The progress made in this direction is very gratifying, and is another indication that the people are awake to the fact, that it is cheaper to evade some of the dangers that accompany the aggregation of communities than to be subjected to the disastrous results that often follow their neglect.

PUBLIC ALMSHOUSES.

The several county almshouses are inspected by the Board every few months, and such suggestions as are deemed advisable made to the administrative authorities. It is gratifying to be able to state that since the inauguration of these inspections there has been a great improvement in these institutions. The county almshouses afford a home for some twelve hundred unfortunates, better than many of them ever had before. They are compelled to endure no hardships, have plenty of good food, good beds, in fact, enjoy the comforts of life to a degree before unknown to some of them at least. Of course there are some of the inmates who have seen better days, but even for them this refuge is a blessing in the time of their misfortune.

The management of these institutions is good and most of the counties take more or less pride in them. We have made frequent reports upon the general condition of the almshouses. The annual report of this Board for the year 1889 contains a detailed description of each almshouse in the State. A brief report concerning their present condition is also given elsewhere in this volume.

RAILROAD SANITATION.

The various railroads of the State are giving more attention to sanitary questions than formerly. There is now a disposition among railroad corporations to give due consider-

ation to the comfort and convenience of the traveling public, not only by means of rapid transportation, cheap rates, and elegant coaches, but by providing better stations and more attractive grounds. To this end much labor and money have been expended within a short time, and the results are noticeable all along our railroad lines, chiefly along the lines of the Boston & Maine, the Concord, and the Maine Central. As these corporations control most of the roads in our State, the improvements are consequently wide-spread. But the spirit of progress is also manifested by other roads; even the Grand Trunk, a line noted for its dirty stations and grounds, has felt the influence of the age and is making some improvements in this direction. The Boston & Maine, the Concord, and the Maine Central are progressive corporations and during a short period have greatly improved the sanitary conditions of their respective lines. This has, perhaps, been accomplished through the broad purpose of a general improvement, rather than by special effort to this particular end; but it should be stated that these railroads have expended no very inconsiderable sums solely for the purpose of bettering the sanitary condition of some of their stations. We are also advised that other extensive changes are contemplated in the near future. At some stations there is urgent need of alterations and changes, nearly all of which are known to the respective roads.

We have reason to expect that there will be no retrograde movement in the policy that has already given us marked evidences of proficiency and advancement.

VITAL STATISTICS.

The amount of hard labor and pains-taking detail connected with the collection of vital statistics is out of all proportion to the little interest taken in the work by the general public; nevertheless, the value of an accurate registration of births, marriages, and deaths, and of the statistical tables compiled during months of ceaseless industry, is incalculable to the State and an indispensable obligation which the common-

wealth owes to every citizen. These records constitute an index to the health-rate or to the death-rate of every town and city in the State, and to the thoughtful and considerate man seeking a residence for himself and family, as well as to the public-spirited citizen who desires that the health standard of his town shall be maintained at a high rate, the registration reports, or the information deduced therefrom, is a valuable guide. The mortality of a given place for a series of years, if accurately returned and recorded, becomes an infallible register of the healthfulness of the locality. If the mortality rate is low the citizen knows that his family is more safely guarded against illness than if the death-rate were higher; and if the continued death-rate is high the health authorities are admonished thereby that there is urgent work for them to do. No health department can direct its work to the greatest possible advantage without the knowledge revealed by an accurate registration of the causes of death within its jurisdiction.

A record of the births, marriages, divorces, and deaths taking place within the State shows the actual movement of the population in various directions with more exactness than can be obtained from any other source.

In addition to the information of a public nature thus secured, it frequently happens that questions of great individual importance, resting upon the record of a birth, a marriage, or a death, can be settled in no other way. As a matter of fact, the registration of vital statistics in New Hampshire commenced about ten years ago, and is yearly becoming more accurate and valuable, especially the returns of marriages and deaths. The Registration Report, compiled under the direction of the secretary of this Board, has grown to be a work of great labor and constitutes a volume nearly the size of the annual reports of this Board. It is composed chiefly of statistical matter and is designed for purposes of reference. This report may be found in the public libraries of the State and is also distributed in various other directions. If they are continued without interruption they

will become in a few years an invaluable guide to the health officer in the work of reclaiming unsanitary localities, and in preventing and restricting many of the diseases that now figure too largely among the causes of death.

REGULATING THE PRACTICE OF MEDICINE.

Many foreign countries, as well as several States in the Union, have already recognized the fact that the people should be protected against the merciless and unscrupulous impostors who travel about, advertising to cure all forms of disease or to have most miraculous powers in certain specialties. These quacks, some of them well educated and consequently more finished and adroit in their manner, offer the most attractive and alluring inducements to the afflicted, who, prompted by the hope of receiving benefit, too often become the innocent and defrauded victims of these itinerant swindlers. Their promises are delusive, and their charges, always cash down, extortionate. The sick, especially those suffering from long-standing or chronic diseases, naturally enough grasp at anything that offers any hope of recovery, hence they should be protected by law against the seductive coils of charlatanism.

In our own State the evils of medical quackery have frequently been seen. We have had for several years a law which has accomplished something, although it has been pronounced unconstitutional and on the first of January, 1892, when the Public Statutes take effect, will be repealed. Our State is now the favorite haunt of several noted, disreputable, conscienceless medical swindlers, whose lying hand-bills and advertisements are familiar to the public.

A bill regulating the practice of medicine was defeated at the hands of the last Legislature, because the measure was regarded as too weak and defective, especially after it had been amended by the House, to secure the desired end—the protection of the people. The subject should receive the consideration of the next Legislature and a law be enacted that will protect all while it shall injure no one.

THE CATTLE COMMISSION.

One of the most important laws enacted at the last session of the Legislature was that creating a state board of cattle commissioners. If vigorously executed it cannot fail to afford great protection to the stock owners of the State against the spread of tuberculosis and other dangerous animal diseases. The law provides that the secretary of the state board of agriculture, the master of the state grange, and the secretary of the State Board of Health shall constitute the commission. The board was organized early in the year and commenced work at once. Petitions for the inspection of herds supposed to be infected with tuberculosis have kept the board constantly at work thus far in this one direction. Up to date many herds have been examined, and about sixty animals found to be infected with the disease have been destroyed. The importance of this work can only be realized when it is remembered that tuberculosis (consumption) in the cow and in the human family are identical, and that doubtless the germ of the disease is not infrequently conveyed to persons through tuberculosis meat and milk — chiefly the latter. The State has, therefore, truly taken a step in the right direction in protecting its citizens against one of the sources of the most fatal and insidious diseases known to mankind. The law referred to will be found elsewhere in this report.

THE COMMISSION OF LUNACY.

The State Board of Health by virtue of a law enacted in 1889 is also a Board of Commissioners of Lunacy. The work which devolves upon the Board in the latter capacity is considerable and exacting, and is represented in a separate annual report. It may, however, be a matter of public interest to state that during the year one hundred and five indigent insane persons have received remedial treatment by order of the Board. Of those committed during the year for remedial treatment 13.79 per cent have recovered; 4.6 per cent much improved; and 6.9 per cent improved. These

results alone are more than sufficient to justify the enactment of the law under which these results have been accomplished.

Those wishing a more detailed statement of the work of this department are referred to the annual report of the Board of Commissioners of Lunacy.

SECRETARY'S REPORT.

COUNTY ALMSHOUSES, ASYLUMS, AND JAILS.

ROCKINGHAM COUNTY ALMSHOUSE AND JAIL.

Two important improvements are being added to this institution, to wit, a new building for the demented class of the insane, and a water tank for the purpose of securing an abundant water supply for sewerage purposes. The new building for the insane is a wooden structure 47 x 30 feet on the ground, two stories high, and containing 32 rooms. It is divided into two wards, one for males and the other for females, and is to be heated by steam. The building is designed especially for the class mentioned and is sheathed throughout. It is located directly in the rear of the building occupied by this class at the present time and about 100 feet in the rear of the main asylum, and as soon as the new building is completed the old one will be removed to a position adjoining the stables and will be used for a carriage-house. This change will prove a material improvement for a few years to come.

The water tank alluded to is located in the rear of the almshouse; it is built upon supports and has a capacity of about 10,000 gallons. It is built precisely like the modern railway tanks and its elevation is sufficient to force the water to the highest point of the roof of the almshouse, the top of the tank being about 10 feet higher than the most elevated portion of the roof. The tank will be supplied from a pond in the field by steam power, and is intended for fire and sewerage purposes solely.

The general condition of the almshouse and other buildings, so far as cleanliness and neatness are concerned, was most excellent. The rooms are kept well whitewashed and the floors and other woodwork thoroughly scrubbed. The jail, which at the time of the inspection accommodated 48 prisoners, was in a most excellent condition; it was perfectly neat and clean throughout—in fact, in this respect the institution could not be improved.

The institution contained at the time of inspection 191 inmates, 12 of whom were children under fifteen years of age. The managers are Mr. and Mrs. Charles C. Tucker.

STRAFFORD COUNTY ALMSHOUSE.

No very material changes have been made at this almshouse since our report last year. There were present at the time of the inspection 170 inmates, 25 to 30 of whom were children. The institution was in a very neat and clean condition, and the rooms were exceedingly clean and tidy. The walls are whitewashed at least once a year, this adding much to their wholesomeness.

This institution is a house of correction as well for the county, and has upon the average about a dozen prisoners. Some improvements are needed here. The men's closet in the basement should be repaired; some of the fixtures in the basement are not properly trapped, and it is said that at times the odor of the sewer is noticeable; the kitchen sinks should be trapped; and in fact, the plumbing should be carefully overhauled, and an iron sewer should replace the Akron pipe under the building.

The prisoners' cells, which are in the basement, have recently been whitewashed and were in good condition. A few improvements in the line suggested would place the institution in a satisfactory condition.

STRAFFORD COUNTY INSANE ASYLUM.

This asylum contains on an average about 40 inmates, at the time of the last inspection the exact number being 41.

There has been a very great improvement in this asylum since our last report, both in its general cleanliness and appearance, and in its management, but the building itself is far from being a model. It is a cheaply built wooden building, with poor walls and floors, the latter being so loose and defective that frequently when being washed the water drips through into the rooms below. The chief criticism made against this institution in our report for 1889 still holds good. The improvements are brought about chiefly by the use of paint. The county was fortunate, or unfortunate, in having two or three prisoners who were painters, and they were set to work painting the interior of the building. The corridors of the entire upper story had been painted, and those of the lower story were well under way. This had added greatly to the cleanliness of the place, which has never before presented so good an appearance as at present.

The asylum is cared for by Mr. and Mrs. William Driscoll. The county is to be congratulated in this improved condition. The vaults are better cared for than formerly, although the present arrangement can never be satisfactory. It may be remarked here that there is not at all times a sufficient water supply for the almshouse and jail, but the county commissioners are now considering means for increasing the supply.

Whenever this shall have been accomplished, water-closets should be substituted for the privies now in use at the asylum.

The almshouse and asylum are under the management of Mr. and Mrs. Charles E. Demeritt.

STRAFFORD COUNTY JAIL.

This jail is located at Dover, a little out of the compact part of the city, upon a healthful and pleasant elevation. This is the somewhat celebrated "revolving" jail, the only one of the kind in the State.

The buildings are of brick, well constructed, and consist of house for the jailor and the jail proper. The jail proper is divided into two parts, one containing upon the lower floor

the office and upon the upper four cells for women. These cells are stationary, being constructed the same as any ordinary cell, with grated window and door in each. It was from one of these cells, in which he was confined on account of a supposed serious illness, that a noted murderer recently escaped, and not from the revolving cells as has been supposed by some. The cells in the main part of the jail consist of V-shaped sections of a cylinder or turret twenty feet in diameter and two stories high. This cylinder is placed upon bearings so that with proper mechanism it may be revolved. There are ten cells in each story of this cylinder, twenty in all. Surrounding the cylinder and built as closely to it as possible and allow it to revolve, is a network of steel rods and plates, with one opening through the same for each story. When it is desired to admit or release a prisoner, the cylinder is revolved until the desired cell is brought in front of the door in the outer grating. When it is desired to allow the prisoners to come out of the cells into the corridor, as is done daily with possibly a few exceptions, the cylinder is slowly revolved, and as each cell comes in front of the doorway in the fixed grating, the prisoner steps out, and when the cylinder has made one revolution the prisoners may have been all released.

In each cell is a fixed water-closet, with an ample amount of running water, and the sanitary conditions are excellent. The corridor surrounding the cells is of ample dimensions and has several well grated, large windows, making the entire jail pleasant and light. There is in each cell a folding hammock cot which occupies but little space during the day. The front of each cell is open to the fixed grating, thus affording ample ventilation and light. The partitions between the cells, as well as all other parts of the cylinder, are of plate iron or steel.

In each corridor, protected by an ample screen, is a good bath-tub and sink for the use of the prisoners. There is an electrical communication between the jailor's apartments and the cells in each corridor, so that in case of sickness in the

night, or from other cause at any time, the jailor can be summoned.

The jail was neat and clean throughout and is in every respect in excellent sanitary condition. The present jailor is Mr. Frank M. Libby. The jail was built in 1888, and there were 28 prisoners confined in it at the time of the inspection, all males.

BELKNAP COUNTY ALMSHOUSE.

No especial changes or improvements have been made at this institution recently, except that two or three rooms, in the attic of an adjacent building used for a shed, soap-making, etc., have been finished off for the demented insane. These rooms are not suitable for any class of the insane except during the summer season, when they are, perhaps, admissible for demented patients like the three who were found occupying them.

At this point we may remark that the county needs a new and separate building for its chronic insane. There are at this institution some 12 or 15 insane persons, all of whom, with the exception of the three mentioned, are allowed to mingle with the other inmates of the almshouse. Among them are one or two who have recurrent mania and have to be locked up at times. This state of affairs is in a measure unsafe, and greatly disturbs the comfort of the other inmates. Such a building as the county needs might be constructed at a comparatively small cost, as a large building is not required, but it should be so situated as to admit of easy access to the patients and steam heat from the main building.

The general condition of the almshouse is very fair, although some painting is needed and the walls of many of the rooms require repapering, especially in the men's wards.

An increased water supply is demanded. At present the water is pumped by wind power from the bay near by to tanks in the attic of the almshouse. At times when there is not sufficient wind to work the pumps the institution suffers for want of water and has to be very economical in its use.

We would recommend that additional tanks be placed in the attic, or, preferably, that the institution be connected with the public water supply of Laconia.

The sanitary condition of the institution could be improved by abolishing the privy in the basement of the main house, and also those back of the building used as the shed, soap-making room, and quarters for the demented insane. These outhouses are in a very unsanitary condition, and must necessarily remain so, owing to their low situation, as long as they continue in use.

The jail is in a very good condition, except for broken and dilapidated seats and covers in several of the water-closets, and some difficulty with two of the flushing tanks. These should be repaired at once. The cells and corridors were very clean, and were in a satisfactory condition, other than the defects mentioned.

There were 60 inmates present at the time of inspection, among whom were five children. Negotiations were pending for the placing some of the children in good homes; during the present season three children have been placed in good families.

The institution is managed by Mr. and Mrs. Thomas L. Smith.

CARROLL COUNTY ALMSHOUSE.

Quite a number of improvements have been made at this institution during the year. The county delegation in 1889 instructed the county commissioners to make certain changes here, to provide two bath-tubs, one for the male and the other for the female inmates; to furnish better protection against fire, and traps for the various plumbing fixtures. All these directions have been carried out. A large tank, having a capacity of several hundred gallons, has been placed in the attic in the main wing of the almshouse. The top of this tank, which is circular in form, is covered with a substantial floor upon which is a force-pump permanently attached to about 150 feet of hose. Leading from the top of the tank is

a short stairway opening directly upon the roof of the building, and a narrow walk has been made along the ridgepole of this wing and of the main house, so that in case of fire every part of the building can be easily reached. A line of hose constantly attached to a stand pipe in each corridor, is coiled and placed in a case and is always ready for immediate use. The work seems to have been thoroughly done and affords great protection against disastrous results, but the danger from fire will not be reduced to a minimum until the numerous stoves used to heat the building are abandoned. We have before urged, and do now repeat, that there is constant danger from these stoves as they have been managed; they should be abandoned and steam heat substituted. Two new bath-rooms, each supplied with hot and cold water, have been put in. This is a long needed improvement and much appreciated by the superintendent. New sinks have also been constructed in connection with the bath-rooms.

The drainage or sewerage of the institution is better than ever before. The plumbing has been overhauled and good traps placed under all the fixtures. The sewage is discharged into a stone drain outside the building which delivers its contents in an open field sufficiently distant from the premises. The entire institution, so far as internal cleanliness is concerned, is all that could be desired—indeed, it is not an exaggeration to say that a remarkable degree of cleanliness exists throughout the entire building. This is owing to the constant oversight and excellent executive ability of the matron, Mrs. Manson. The value of whitewash is thoroughly understood, and it is applied once or twice a year wherever it can be used to advantage.

It should be remarked that the floors in some of the rooms are badly worn and need replacing, and this to be done within a very short time.

There have been improvements also in the external appearance of this institution. After the new barn was completed the old one was demolished and the fence between the new barn and the almshouse taken away. This gives more room about the buildings and is better in every way.

There are still a few matters that should be attended to, and the county will doubtless make the needed changes as rapidly as practicable. The institution was never before in as good a condition as at the present time.

CARROLL COUNTY JAIL.

In the report of this Board for the year 1889 is a description of this jail, together with some severe criticisms upon it. It was then characterized as the worst jail in the State, and although a few changes have since been made, it still ranks the lowest among our jails. It is in no sense a decent place for the detention of criminals. We discussed the condition of this building before the county delegation in 1889, representing fully its utter unfitness for occupancy, and requesting that at least a fire-escape be provided that would offer some hope of rescuing the prisoners in case of fire; that the cells, which, with a single exception, were so dark at midday that a person could not see to read, should be lighted and some means be devised for ventilating them. The delegation voted to instruct the commissioners to whitewash the cells, to place a small grated window in each, and to furnish some practical means of reaching the prisoners in case of fire. The commissioners complied by putting a window, about 8 x 10 inches, in each cell, the window opening directly against the outer wall of the building and within a few inches of it. This admits air and improves the ventilation, but does not furnish light enough to be of any service. Openings should be made in the outer wall of the jail opposite the jail windows, or some other means devised for admitting light. The fire-escape consists of an iron frame with an iron door set into the wall beneath the window on the east side of the building, and connects with one of the sheds or L's of the almshouse. The utility of this fire-escape is very doubtful. In case a fire should break out in the shed or L mentioned, the fire-escape could not be reached, and if the fire had gotten under much headway the entrance to the jail by the door might also be cut off.

The vault connected with the jail is an offensive, unsanitary affair at best. It is true that the changes made by the commissioners are an improvement over the former condition, but the jail still falls far below what the county should have. The subject of a new jail has been discussed by leading men in the county and it is very generally understood that a suitable building will be erected in the near future. The heavy debt with which this county has been burdened, accounts for the present condition of these county buildings.

At the time of the inspection there were 60 inmates at this almshouse, including two prisoners and seven children.

MERRIMACK COUNTY ALMSHOUSE AND INSANE ASYLUM.

This institution, all things considered, is the best of its kind in New Hampshire; in fact, it does the county great credit in nearly every particular. The buildings are in fine condition and nearly all of them are of comparatively recent construction. The fine brick building which constitutes the almshouse proper, was built but a few years ago. A little later the insane asylum, another large and commodious brick building, was erected. During the past year the county has built a substantial barn 132 feet long by 32 wide and 18 feet post. The few out-buildings are being placed in excellent condition, so that for several years to come the expenditure for construction is likely to be very small.

The improvements suggested by this Board from time to time have been very promptly carried out, almost without exception. During the past year some additions have been made to the equipments of the almshouse. Large sinks for washing dishes have been placed in both dining rooms. Large clothes closets have been built upon the first floor, and additional steam radiators have been placed in the men's room in the attic and in the corridors.

The sanitary condition of the building is good; there is an abundance of water for flushing the sewers and for all other purposes; the institution is in a cleanly condition, the walls

are frequently whitewashed or painted, and every effort is made to maintain the best condition possible in an almshouse.

The insane asylum, by far the best owned by any county in the State, has also been further improved during the year. Registers for hot air have been put into several rooms, experience having shown that the registers in the halls did not sufficiently warm some of the rooms.

This entire institution is managed by Mr. and Mrs. William Tasker, and there were 138 inmates, among them 14 children.

MERRIMACK COUNTY JAIL.

At the time our 1889 report was made, Merrimack county jail was in a very unsanitary condition, as will be seen by a letter written to the county commissioners at that time :

Board of County Commissioners, Merrimack County, New Hampshire:

GENTLEMEN, — Your attention is respectfully called to the unsanitary condition of Merrimack county jail. The water supply and ventilation are inadequate, the plumbing is in a very faulty condition, and the drainage is not equal to the demands necessary to maintain a healthful condition.

In each cell there is a dirty, dilapidated, cast-iron bowl, originally porcelainized, with an insufficient water supply for flushing. These closets are wholly without ventilation, or practically so—an opening in the wall 2 x 2 x 8 inches, just the size of an ordinary brick, amounts to nothing as a means of ventilation. The twelve cells are practically alike in this respect, the sanitary condition of each being exceedingly bad.

There is an opening in the floor of the corridor to allow the wash-water to flow off the brick or concrete floor, and it is directly connected with the sewer without any intervening trap. The sewer leads directly to a cesspool, a few rods distant from the buildings, the odors from which were distinctly noticeable in the corridor.

We would respectfully recommend that new closets, with proper ventilating flues, be constructed for the cells, and that traps be put in wherever necessary.

In the jailor's apartments the bath-tub and wash-bowl are without traps, and proper traps should be supplied for these fixtures. The

small trap under the kitchen sink should be removed, and a trap that cannot be siphoned substituted therefor.

At the time of the inspection the water supply was found to be insufficient for the demands of the jail. Either the tank capacity should be increased, or a pipe large enough to insure an ample supply at all times of the year should be laid to the street main.

In the basement of the jail is a large opening connected with the sewer; this should either be trapped or discarded entirely, preferably the latter. The opening does not seem to be necessary, and is at all times offensive.

We would also suggest, as a matter of economy as well as greater protection against fire, that the twelve stoves now used to heat the institution be abandoned and steam heat substituted therefor. This is not recommended strictly as a sanitary measure, but we believe it would be a much better and safer way of heating the building.

We believe the sanitary condition of the jail to be such that your board would be warranted in taking immediate action to remedy the defects. The present condition is dangerous to the health of the inmates, and we believe the health of those confined there should not be jeopardized by waiting for the action of the county delegation in regard to the matter.

Should your board decide, as we hope and expect you will, to remedy the present unhealthful conditions at the jail, this Board would gladly render any assistance desired in suggesting the necessary changes and the manner in which they can best be carried out.

It will be seen by the above that very radical changes, involving considerable expense, were called for at the time. The county commissioners, fully realizing the importance and necessity of the alterations suggested, took hold of the work with commendable promptness and made the changes suggested. The old soil pipe, closet, etc., were removed from each cell, and the plumbing in other parts of the building thoroughly overhauled. New soil pipes, terminating in the open air above, have been put in, and connecting therewith is a modern water-closet in each cell with a flushing tank overhead. There are twelve cells, and each has been provided in the manner mentioned. The opening in the floor of the corridor which formerly connected directly with the sewer

without any trap, has been properly trapped and is used now only to drain off the water when the hose is used to wash the concrete floor of the corridor. A bath-tub and sink have been placed in the corridor, greatly to the comfort and convenience of the prisoners.

The bath-tub, wash-bowl, etc., in the jailor's apartments have been thoroughly trapped. Heating by stoves has been abandoned and steam heat substituted. The jail formerly had twelve stoves, it now contains but one, the kitchen range. The heating apparatus has not yet been given a thorough test, but it appears to be ample for the institution. The water supply which has previously been short at times, has been increased by putting in a new and much larger pipe in connection with the street water main. Since this alteration there has been no lack of water.

Numerous minor improvements have also been made, and the condition of the jail at the present time is exceedingly good. One other improvement ought to be made, to wit, better ventilation for the jail. Suitable ventilating flues could be constructed with slight expense, which would greatly improve the atmosphere of the jail. We would especially call the attention of the county commissioners to this point. The sewage of the institution is discharged in an open field at present, so far removed from any residence as to be unobjectionable. There is some question, however, as to how long these conditions will exist.

HILLSBOROUGH COUNTY ALMSHOUSE.

Although some improvements have been made at this institution as they have been absolutely demanded from time to time, yet the entire group of buildings is an aggregation of almost worthless houses. More or less money has been expended each year upon these buildings, still no one of them is what it should be. The main building, or almshouse proper, is a large wooden house, four stories in height besides the basement. This building is so frail and the timbers are so rotten as to give rise to suspicions that in a very strong wind there

is danger of its collapsing. Close examination of many of the timbers showed that they are completely decayed with dry rot, even in the second story. In the main hallway a large timber which supports the hall floor, is badly crumbled with dry rot, and this in a position, too, where it would be least expected. The sills of the building, window-stools, and other portions that admitted of ready examination, were found to be in the same condition—indeed, the state of this building is such as to render it extremely doubtful if it would be worth repairing. The building used for the men's insane asylum is also worthless. The women's insane asylum and the building occupied by the old men were built more recently than the others, hence are in a better condition, but they are cheaply constructed wooden buildings.

The laundry and home for the old women and the school-room are located in one building, while adjacent to it is the boiler which furnishes heat and power. The laundry machinery, running six days in the week in the basement, causes much annoyance in the other departments which are directly over it. This arrangement is entirely wrong; the whole building is required for laundry purposes. At the present time all the clothes have to be carried from this building across the yard into the dining-room of the main house, to be ironed after the meals are cleared away. There should also be a separate building for the schoolroom. There are now about 40 pupils. If this institution is to be maintained, these changes should be made. This building is the best of the entire group—in fact, it is the only one that could be suitably arranged for a laundry.

The superintendent's house is also in a state of decay. The condition of these buildings, as regards fire, is one of constant peril, there being nothing whatever to prevent their being entirely destroyed, with great loss of life, should a fire get under headway. There are absolutely no facilities for extinguishing fire. The water supply is wholly inadequate for any such purpose, and with all the force obtainable, water could scarcely be thrown into the second story of the build-

ings. The neglect of the county delegation at its last meeting to provide some remedy for this great danger, as well as for other needs, after having examined and duly understanding the conditions, is inexplicable. The water supply is from a reservoir which was formerly used for a silo, and is elevated but a few feet above the level of the buildings. It is supplied by wind power and two hydraulic rams. There is ordinarily scarcely water enough for domestic purposes, there being times when the supply is insufficient and water has to be pumped from wells on the premises. The present supply is not sufficient to run a system of water-closets in addition to what it is now doing. There is no system of sewers worthy the name at the institution. There are no water-closets, and the old vaults, notwithstanding the efforts of the superintendent, are always in an unsanitary condition.

The only thing to be commended at this almshouse is its administration. All the buildings, wards, and rooms, were in the greatest possible state of cleanliness, indeed it was almost surprising that the walls and floors of some of the rooms could be kept so clean, with wide, open cracks and rough and badly worn boards as were especially noticeable in the men's insane asylum. These cracks in the floors and walls are constant harbors of vermin and it is only by the daily use of insect powder that these pests can be controlled. Every part of the institution was thoroughly neat and clean, the beds in good order, with clean sheets, pillow-cases, and spreads. The greatest praise is to be given the superintendent and matron for their constant efforts and their great success in keeping the institution in so good a condition.

When the present site of the buildings was selected, the county had less than 100 paupers, but with the rapid increase in the population this unfortunate class has increased until it now has over 300 inmates at times in the almshouse. It can readily be seen that an institution designed to accommodate 100 inmates would not be suitably appointed for three times that number.

In view of the present condition of these buildings, we

would recommend, that this location be abandoned, and that an institution ample for the needs of the county be constructed at some more accessible point.

At the time of the inspection there were present 256 paupers, 21 prisoners, and about 60 children.

CHESHIRE COUNTY ALMSHOUSE.

Since our last report on this almshouse the county has erected a brick building on the east side and in the rear of the main house, for laundry purposes and to provide extra room for the insane. The building is two stories high, very thoroughly and substantially built, and covered with metal shingles. A small brick room connected with this building contains a small boiler and engine to furnish power for laundry purposes in the building proper. The first floor is devoted to the laundry, clothes room, drying room, three rooms for the insane, four water-closets, sink, etc. In the second story there are six rooms, besides one containing the sink, water-closet, and bath.

The entire building is finished in hard pine, including walls and ceilings overhead, and is heated by steam. There is a ventilating shaft in the centre of the building, with registers opening into it from the corridors. The rooms are ventilated into the corridors by means of large transoms over the doors.

The second story of this building is connected with the main almshouse by a covered walk. There is a well-constructed basement divided into two parts, one of which is used for a vegetable cellar, and the other for the men's smoking room.

This building is just what has long been needed, except that it is not large enough to provide accommodations for all the county insane. The ward for the insane in the main house, which it was thought might be vacated and used for hospital wards after the building for the insane should be finished, is still occupied by the insane, there not being sufficient room for them in the new building.

The general condition of the almshouse is good. The rooms and beds were very neat and clean.

A few changes should be made. One closet in the main house is still connected with the old sewer or drain which discharges in the field a short distance from the house. This should be connected with the sewer proper. The superintendent's buildings also need some alterations or repairs. It is understood that the county contemplates raising the building and somewhat enlarging it. Something in this direction seems to be necessary.

The institution is under the management of Mr. and Mrs. H. D. Pierce.

SULLIVAN COUNTY ALMSHOUSE.

This county, like some others in the State, labors under the misfortune of having attempted to utilize a set of old farm buildings, by adding thereto, for the purposes of a county almshouse, with the invariable result, of never adequately attaining that end. The buildings were poorly constructed, as well as improperly designed; but with the improvements that have been made from time to time, the general condition of this institution is better than heretofore, although the opportunities for advancement in this direction are by no means exhausted. Improvements have been suggested to the county commissioners by this Board, from time to time, during the past ten years, many of which have been carried out. Only a few years ago the institution was heated by means of more than a dozen stoves, some of which were dilapidated and broken; the insane were kept over the woodshed, in rooms little better than large dry-goods boxes, and receiving but little care; the sanitary arrangements were absolutely bad; the rooms of the almshouse were much in need of paint and paper; there were no fire escapes, and many other conditions were open to criticism. These things have all been changed. A building for the insane has been erected; steam heating put in; the general sanitary conditions improved; fire-escapes provided; and the interior of the building placed

in better condition. During the past year hard-wood floors have been laid in the halls of the almshouse and in some of the rooms; this is a great improvement over the old floors, which were well worn and badly shrunk. The work should extend to other rooms. The privies have been removed to a less objectionable location and are better cared for than formerly.

The administration of the institution appears to be excellent. The rooms were exceedingly clean and neat, and the beds and furniture equally so.

There were 51 inmates at the time of inspection. Among this number were six children, ranging from eleven months to ten years of age. It was especially noticeable that every one of these little unfortunates was bright, pretty, active and fully equal to the average child in mental capacity. Two of the children had no parents at the institution; the other four had mothers only with them. These mothers were wholly unsuitable, from a moral, mental, and physical standpoint, to care for and bring up these little ones.

The building for the insane was scrupulously neat and clean. Five women and one man were constantly confined in it, except when they were allowed out with an attendant. Three of the women were given their liberty inside the building, and were found together in a sitting-room, apparently enjoying this common privilege. The other two were kept locked in their rooms, for the reason that there is no constant attendant in the building, and the three first mentioned are afraid of the other two. It should be stated that a change has recently been made in the management of this institution, and a woman especially interested in this unfortunate class has charge of the insane females. Through her kind care a marked improvement has been brought about among these inmates. Two of the group of three above mentioned were formerly kept in close confinement in their rooms, and their present increased comfort and improvement in personal appearance is due wholly to a little care and kindness, prompted by the Christianity of the woman in charge of them. One of

the two still kept in confinement, had been locked into a close room for years, with no bed, except a mattress and blankets put in at night; no furniture whatever, not even a chair; she wore a print dress not over clean, and went barefooted. She now has a clean and neat bed and a tidy room, which she takes care of herself, and is cleanly and neatly dressed—and this change was brought about in a few days by patience and kindness. This instance is given solely to show that even the incurable insane are capable of great improvement through proper influences, and it is a most forcible argument in favor of the better care of the indigent insane.

The institution is in charge of Mr. and Mrs. Charles Willard.

GRAFTON COUNTY ALMSHOUSE.

This almshouse is in a very good condition, some general improvements having been made during the past year. The buildings have been painted upon the outside, greatly improving their appearance. Many of the rooms have been papered, painted, and whitewashed. This is a great improvement, as the walls had become badly soiled and the paper torn off in many places. The entire building was found to be in a very cleanly condition.

We would call the attention of the county to the suggestions made by this Board in its report of 1889, regarding an increased water supply. The present supply would be wholly inadequate in case of fire.

The general condition of the entire institution is good, and with the necessary improvements from time to time, can be so maintained for many years to come. The changes made by the county during the past five years have been of considerable magnitude and have placed the institution on a par with the other almshouses of the State.

The county maintains on an average 120 inmates at its county farm, at the time of inspection there were present 13 children under fifteen years of age.

Mr. and Mrs. H. R. Norris are in charge.

GRAFTON COUNTY JAIL.

This jail is located at Haverhill. From the street the institution presents the appearance of an ordinary dwelling-house, with L, barn, and stable in the rear. The site embraces some two acres of land. The front or main part of the house is occupied by the jailor's family, while the jail proper is connected with and in the rear of the main house, and is visible from but one point in the road. The buildings were apparently erected many years ago, and are somewhat out of repair. The jail proper is built wholly of stone and brick, chiefly the former. It contains six good sized cells, and is two stories in height, there being three cells in each story, with an ample corridor below, and a stairway and narrow corridor leading to and in front of the upper cells. Each cell has a window and is sufficiently lighted. This jail is said to have been built nearly fifty years ago, and the cells are somewhat larger than those in more modern jails; in this respect it is to be commended.

The sanitary condition of this institution is the most abominable to be found in any institution of its kind — or for that matter, in any other — in the State. It would be difficult to devise a more filthy and disgusting arrangement than is here to be found. Just outside the walls of the jail is a brick and stone vault into which discharge three soil pipes, one for each tier of cells. These soil pipes pass through the jail wall, which is also one wall of the vault, and continue through the floor of the second story cells, and the closet bowls are placed upon the ends of these four-inch soil pipes without any intervening traps. In the lower story the cells are connected with the soil pipes by means of direct branches set at an acute angle with the main pipe, and upon the ends of these branches are fixed the closet bowls for the lower cells. The closets are not supplied with water, and the only means of flushing them is by pouring water from the wash-bowl or pitcher. This amount of water is entirely too small, and, as a consequence, the bowls, both above and below, and the

soil pipes are in a constantly filthy condition. At the time of the inspection three prisoners, two men and a woman, were confined in the jail, and all complained bitterly of the odor from the pipes and vault. The bowls were covered as effectually as possible by the prisoners, to prevent the upward current of air coming directly from the vault, since there is not a single trap upon the soil pipes or the fixtures.

In the jailor's house the sink drain is of the most defective kind. A pipe runs from the sink down through the floor into the cellar, and there connects with a wooden box drain, which delivers the sink water some seventy-five feet from the house. This box drain passes through the cellar wall and is practically open. The sink pipe connecting with this box drain is not trapped. Close beside the box drain in the cellar is a large tank from which the water supply of the institution is obtained, and the over-flow pipe of this tank connects directly with the box drain referred to. A more filthy arrangement could not be devised, and it is not to be wondered at that the jailor last year lost a son from typhoid fever. The sanitary condition of the entire institution is such as to jeopardize the health of all those living within its walls, and should be remedied at once by the county.

Another defect of this jail, from a moral standpoint, is the manner in which prisoners of both sexes are confined in it. A woman prisoner, who was here awaiting trial, was locked into one of the upper cells, while the adjoining cells were occupied by men who had the freedom of the corridor, and could not only pass in front of the woman's cell, and see her through the grated door, but could also converse with her at any time. The woman very seriously objected to her situation, as she had a moral right to do.

If this institution is to be maintained by the county, as it is likely to be for several years to come, it should at least be placed in a good sanitary condition at once, and otherwise brought up to a par with similar institutions in the State. A complete system of improved drainage and sewerage should be put in at once.

The present jailor is Mr. E. B. Morse. He and his family are constantly apprehensive of the dangers to which they are being subjected by the unsanitary condition of the place. They complained that the odors from the sewer are very strongly noticeable in the kitchen and other parts of the house at times, and in order to overcome it chloride of lime is frequently used.

It is but justice to the present board of county commissioners to say that they have just come into office, and it is but reasonable to hope that they will promptly carry out the suggestions offered in this report. The responsibility for the present condition of the institution must rest upon the former board of commissioners, and we can account for the neglect to carry out their promise of reform, only by the fact that two of their number died during their term of office. The following correspondence shows that their attention was called to the condition of the jail, and that an early consideration of the matter was promised.

CONCORD, N. H., October 31, 1889.

Board of County Commissioners, Grafton County, N. H. :

GENTLEMEN,—We desire to call your attention to the unsanitary condition of the Grafton county jail at Haverhill. Complaint has been made to this Board by the local board of health of that town, stating that the plumbing is in a very defective condition, so much so as to endanger the health of the inmates. A fatal case of diphtheria has recently occurred at the jail, and it is believed that the bad sanitary conditions of the institution were a serious factor in the case. It is stated that the drain pipes connecting with the cesspool are untrapped and that the odors and poisonous gases from the cesspool have ready access to the jail building, through these untrapped pipes. Complaint has also been entered from other sources. We are creditably informed that prisoners have complained very seriously of the objectionable and disgusting condition of the drainage at this institution. In view of these facts you are respectfully requested to take such action as may be necessary to place this institution in a good sanitary condition. Our Board will gladly give you any assistance in our power in this matter.

Very truly yours,

(Signed)

IRVING A. WATSON, *Secretary.*

LEBANON, N. H., November 4, 1889.

Dr. Watson :

DEAR SIR, — Your communication addressed to Grafton County Commissioners, in relation to Grafton jail and its condition in a sanitary view, is received by me only this afternoon. As you directed to H. H. Holt, Lyme, instead of to me here, it has been so long delayed.

I write you to say we will give it our earliest attention.

Thanking you for your courtesy, I remain,

Yours truly,

(Signed)

D. B. EMERSON.

LEBANON, N. H., November 6, 1889.

Dr. Watson :

DEAR SIR, — We find there has been no case of diphtheria at the jail in Haverhill. The jailor's son contracted typhoid fever elsewhere and came home, was sick, and died there. No sickness amongst the confined at the jail.

I am yours truly,

(Signed)

D. B. EMERSON.

CONCORD, N. H., November 12, 1889.

D. B. Emerson, County Commissioner, Lebanon, N. H. :

DEAR SIR, — In reply to your favor of November 6, I would say that owing to an error, such as will occasionally occur in a dictated letter, I was made to say diphtheria instead of typhoid fever in referring to the fatal case in the jail in Haverhill. I had reference to the jailor's son who recently died at that place.

Regarding the sanitary condition of the jail, some of the attorneys of Grafton county who have had occasion to go there have complained that its sanitary condition is exceedingly bad, and others have observed its condition. I trust that your board will remedy the defects which cause or admit of this state of affairs.

Very truly yours,

(Signed)

IRVING A. WATSON,

Secretary.

The above correspondence is given for the purpose of placing on record the fact that official attention has been directed to the condition of the jail, and also that there was

an expressed willingness on the part of the former board of county commissioners to give the matter their earliest attention. Immediate action by the present board is expected.

A copy of the foregoing report has been placed in the hands of the county commissioners, and we are assured that the jail will be put in a good sanitary condition at once.

COÖS COUNTY ALMSHOUSE.

Since our last report, made two years ago, there has been but little change at this institution, excepting the repairs made necessary by the fire which occurred June 17, 1889, by which the roof of the main building was badly burned and the plastering throughout the house considerably damaged by water. This building, reconstructed from an old farmhouse, was not so well nor so substantially built as it should have been for the purposes of an institution of this character. Thin boards, split in a haphazard sort of a way, were used as substitutes for laths. In many places the seams were too narrow, in others too wide, to give support to the plaster, hence there are frequent large patches where it has entirely fallen off. The plastering was thoroughly repaired after the fire alluded to above, but it has already begun to drop off again. Overhead in the lower hall sheathing has been substituted for plaster, and also in some of the attic rooms. It is proposed to sheathe the upper hall and some of the other rooms. Many of the rooms on the first floor have been painted, both woodwork and plastering, in different colors, making them exceedingly clean and attractive to the eye. This work was done by one of the inmates, so that the only expense incurred by the county was for the materials used. It is suggested that this work be continued throughout the remaining rooms of the institution.

One of the improvements contemplated by the superintendent is the making of a ward for the sick in the upper story, which is a very large, light, and airy room now used as a sleeping apartment by some of the inmates. We believe this change would add much to the comfort of the inmates, and in every way be beneficial to the institution.

The old building in which the violent insane have been confined for several years, still remains in practically the same condition as heretofore. It is an entirely worthless building, wholly unsuitable and inadequate for such a purpose. It is a long, narrow building, having in one end the boilers, laundry, and dry-room, and in the other the latrines for the institution, while in the middle portion there are fourteen small rooms, or cells, for the confinement of the insane patients. The building is a one-story structure, originally built in the cheapest possible manner, now settled and somewhat twisted out of shape, and generally dilapidated. The county needs a new building for its insane.

The general management of the institution seems to be most excellent. The superintendent and matron manifest great interest in their work, and a kindness toward the inmates which is most commendable. The premises were neat and clean.

Mr. and Mrs. Freeman G. Marshall have charge of this almshouse, and at the time of inspection there were 75 inmates, including 15 children. Arrangements had been made to send four of the children to the Orphans' Home at Franklin.

COÖS COUNTY JAIL.

At the session of the legislature in 1889 the Coös county delegation voted to appropriate \$5,000 for a new jail, to be built upon the site of the old one, which for a long time had been a standing disgrace to the county. The old jail has been demolished and a new one erected in its place, and while the latter is a great improvement over the former, there are still some defects of construction which the county should remedy at once. The jail proper consists of two tiers of cells, separated by a corridor six feet in width, each tier having six cells, three on the ground floor and three above.

The entrance to the cells is from the inside corridor, to reach which one must first pass into the outside corridor, thence through a door into the inner corridor. The outer

corridor, which extends around the cells on two sides and one end, is very narrow, being only about two feet wide at the sides, while in front it is sufficiently wide to allow room for a stairway to the second inner corridor and cells, which are arranged substantially the same as the lower row.

The cells are built entirely of iron, the outer walls being of iron or steel gratings, while the partitions between the cells, those facing the inner corridor, and the ceilings are of plate iron or steel. The floors are concreted. There is one door in each cell, opening upon the inner corridor and having an aperture through which may be passed dishes not larger than an ordinary tea plate. Each cell has a bunk for the prisoner to sleep upon, and also a water-closet. The entire building surrounding these cells—that is, the outer walls of the jail—is constructed of wood. The method employed in the construction of the cells is different from anything we have heretofore seen, and we must confess that there are obvious reasons why it is not to be recommended as a model.

Entering the outer corridor the first impression reminds one of cages in a zoölogical garden. There is no seclusion whatever for the prisoner, especially if he is unfortunate enough to be assigned to one of the corner cells. It may be that this system has the merit of cheap construction, but if there is any other we failed to discover it. The corridors are too small to allow sufficient room for exercise. The outer corridor is not designed to be accessible to the prisoners. At the time of inspection there were 14 prisoners, only two of whom were allowed access to the corridors.

Among other things open to criticism and which demand the immediate attention of the county authorities, are the following:

1. The entire institution, under the conditions found at the time of inspection, is a veritable fire-trap. No means whatever were at hand to extinguish fire. It should be remembered that the jail is attached to a set of farm buildings, somewhat old, consisting of house, L, and barn, and if a fire should get under headway in that portion of these buildings

adjacent to the jail, it would be impossible to save the prisoners. The county authorities must be held criminally responsible as long as this state of affairs is allowed to exist.

It is recommended that the entire wooden walls surrounding the cells be rebuilt of brick in such a manner as to render it fire-proof, or that some other positive way be devised to protect the prisoners from this great danger. At the time of the inspection not half a dozen pails of water could be obtained at the institution.

2. In the attic of the jail is a tank designed to hold about 100 gallons of water, but it did not then contain a pailful. In the same attic, upon a slightly lower level and directly over each cell, are placed six automatic flushing tanks. A bifurcated pipe is connected with each tank, one arm of which conducts water to the closet in the upper cell and the other to a closet in the lower cell beneath the tank. These smaller tanks, which hold a pailful or more of water, discharge automatically as often as they fill, and at each discharge flush the closets with which they are connected. Inquiry revealed the fact that the water supply has been short for a long time, and as the water is not exactly equally distributed to the flushing tanks, one or two of them were discharging all the water, while the others did not flush at all. Water is also conducted into each cell by means of pipes connecting directly with the flushing tanks, a very unsanitary arrangement, and having faucets attached, so that each prisoner can draw water into a wash basin. As most of the flushing tanks contain a little water at all times, the prisoners have resorted to the practice of drawing it off through the faucet into the wash basin and then using it to flush the closets. The large tank in the attic is supposed to be supplied by a small system of water works owned by private individuals. There is an urgent and imperative demand for an increased water supply.

3. The automatic arrangement of the flushing tank should be changed to one under the control of the prisoner. This is

the only proper way to control the flushing of the closets, and it would also make a great saving in the amount of water consumed.

4. The cells should be better supplied with furniture and bedding. Some of the cells contained nothing whatever except a worthless mattress and a single blanket. Each cell should be provided with a table or stand, a chair, and a reasonable amount of bedding. Some of the prisoners were slightly better accommodated, while one whose crime was a hundred-fold greater than that of the majority confined there, had all the comforts that could be afforded.

5. Some portions of the jail were exceedingly dirty, and the only means of ventilation is by raising or lowering windows, which is, of course, entirely impracticable except during the summer season; and as even this cannot be done by the prisoner, the ventilation depends upon the attention of those who look after the inmates.

While some of the comforts and luxuries found in the one cell alluded to, may possibly have been contributed by friends while the man is awaiting trial, such considerations do not account for the extra liberty allowed him, or the neatness and cleanliness of bedding, cell, etc.

There was much evidence to prove that the management of the jail could be materially improved, and must be in order to place the institution upon a par with similar institutions in the State. The prisoners are required to sweep their own cells. The filthy condition of one, especially, was said to be owing to the fact that the two occupants of the cell refused to do this work, and as a consequence they were being deprived of their food, not having had anything to eat for the previous twenty-four hours. This practice is not required in jails, and it is the duty of the jailor to keep the premises in a cleanly condition at all times.

The prisoners also complained that, greatly to their dislike, they were occasionally placed on exhibition by the servant girl, who had a key to the outer corridor, and who not infrequently had several of her associates in to see the prisoners.

From the positive evidence which was obtained at the time of the inspection, we do not hesitate to say that many changes are demanded at this institution.

PORTSMOUTH SCHOOLHOUSES.

The following report upon the heating and ventilating of the Whipple and Farragut schoolhouses, in Portsmouth, is self-explanatory :

THE STATE OF NEW HAMPSHIRE.

STATE BOARD OF HEALTH.

SECRETARY'S OFFICE.

CONCORD, May 20, 1891.

To His Honor the Mayor and Board of Aldermen, Portsmouth, N. H. :

GENTLEMEN, — In accordance with a request made to this Board by your Honorable Board, to examine the system of heating and ventilation in use at the Whipple and Farragut schools of Portsmouth, we respectfully submit the following brief report with conclusions and recommendations :

An examination of the said buildings was made on behalf of this Board, on May 15, by its secretary and Dr. J. J. Berry, assisted by Prof. E. R. Angell and Dr. S. C. Heffenger.

WHIPPLE SCHOOL.

An examination of this building was commenced immediately after the school opened in the forenoon. Good fires were found in the four furnaces used for heating purposes, and also in each of the two stacks or chimneys for exhaust purposes; therefore, the conditions under which the tests of the ventilating capacity of the system were made were most favorable, and must have shown the system in its best working order, under the climatic conditions of that date.

An examination of the dry closet chambers showed a fairly complete desiccation of the matter deposited therein, with a fairly strong

outgoing current, the velocity of which was not measured. Upon the boys' side of the house, with a single closet cover raised, there was a downward current of air through the opening at the rate of 235 feet per minute. At the urinals no current was developed, the air being apparently stationary in the pipes leading therefrom. On the girls' side there were four broken covers, and with two open there was a downward current of air at the rate of 205 feet per minute.

Schoolroom, Grade No. 1. (Primary.)

This room has a seating capacity of forty-eight, and there were present forty-two pupils. A careful measurement of this room, with computation of cubic space per pupil, proved it to be ample, and the same may be said of several other rooms whose measurements were taken. It is assumed that the same is true of all the schoolrooms of the buildings examined.

The room is heated and ventilated through an incoming flue in the wall, some eight feet above the floor, and nearly midway of one side of the room; the exhaust, or outgoing flues, are located nearly equidistant from each other in the remaining three sides of the room, in the baseboards, and are ten in number. A measurement of the superficial area of the incoming flue gave 630 square inches, and from this was deducted, after careful measurement, 118 square inches, the loss in superficial area occasioned by the lattice-work across the flue, leaving 512 square inches, superficial area, through which all the incoming air is received. Calculations in the other rooms referred to were made in the same manner. The windows were closed during all the experiments. A measurement by the anemometer gave the velocity of the incoming warm air (fullest amount possible), as 255 feet per minute, equivalent to 21 cubic feet per minute per scholar, or 1,260 cubic feet per hour.

For a better understanding of these and subsequent figures, it may be proper to state at this point that the best medical and sanitary authorities upon schoolhouse ventilation, place 1,800 cubic feet of air per hour as the minimum amount allowable for each pupil. Many authorities regard these figures as too low. It is estimated that 30 cubic feet of fresh air is required per pupil each minute, in order that the carbonic acid gas thrown off by the lungs shall not accumulate to an extent of more than six parts per 10,000. The amount of carbonic acid in the atmosphere of a room is regarded as an index to the amount of organic matter eliminated by the lungs, by surface evapo-

ration, etc. It will, therefore, be seen that the full volume of warm air supplied to this room was considerably less than the minimum amount allowable.

With the warm air shut off, by reversing the damper, the velocity of the cold, fresh air coming in was found to be only 83 feet per minute, equal to seven cubic feet per minute per pupil, or 420 cubic feet per hour, a condition which, if long continued, would render the air intolerable, and extremely dangerous to those confined in it.

The baseboard registers, with warm air turned on, showed a fair outgoing current in eight out of the ten, the two nearest the incoming flue showing no current at all. With the warm air turned off there was a feeble outgoing current in only three of the registers, no movement of air taking place in the others. A momentary reverse current was established through some of the registers upon opening the door into the hall.

Room 6, Grade 6.

Thirty-three pupils present. With warm air fully turned on there was a velocity of 220 feet per minute, giving 24 cubic feet of air per minute per pupil, or 1,440 cubic feet per hour. With the warm air shut off and the cold air admitted, it was found that the latter had the greater velocity, 233 feet per minute, giving 25 cubic feet of air per minute per pupil, or 1,500 per hour. It was difficult to account for this condition, except upon the theory that the prevailing current of outside air had a greater propelling influence upon the volume of air in the pipes than did the draft from the stack upon the hot air. With the cold air on, the anemometer revealed a fairly rapid current of outgoing air in the flue nearest the teacher's desk, and slightly feeble currents in only a part of the remaining flues.

Room H.

Velocity of incoming warm air, fullest capacity, 330 feet per minute, equivalent to 28 cubic feet per minute per pupil, or 1,680 per hour. There were 41 pupils present. Temperature of room, 68 degrees F.

Velocity of incoming current of cold air, 190 feet per minute, equivalent to 16 cubic feet per minute per pupil, or 960 per hour.

With the cold air on, two of the baseboard flues showed stationary air, while in the remaining flues the currents were variable. The experiments made in the rooms mentioned were deemed sufficient for the time and purpose. A test of the heating capacity of the

system was, of course, out of the question at that date ; but evidence was submitted, showing that the system had failed to heat the rooms to a satisfactory degree during some of the colder days of the winter. The following table presents a brief summary of the results of the investigation, and reveals at a glance the fact that the system as applied to this building is inadequate and unreliable :

ROOM.	Pupils.	Warm air per hour per pupil.	Cold air per hour per pupil.
		cubic feet.	cubic feet.
Primary	42	1,260	420
Six.....	33	1,440	1,500
H.....	41	1,680	960

These figures show that in no case did the amount of fresh air reach even the minimum amount required, 1,800 cubic feet.

FARRAGUT SCHOOL.

This building was visited on the same day as the Whipple school, at about eleven o'clock A. M. The basement contains three furnaces for heating purposes and two exhaust stacks or chimneys. There were good fires in the furnaces and also in the stacks.

Room F.

Velocity of incoming warm air, 180 feet per minute. There were 43 pupils present. Computations upon the required measurements showed that 15 cubic feet of warm air was provided per minute per pupil, or 900 cubic feet per hour. The incoming cold air had a maximum velocity of 170 feet per minute, but the velocity varied greatly, being nearly stationary at times. Calculations based upon the maximum rate showed 14 cubic feet of air per minute per pupil, or 840 feet per hour. Some of the outgoing flues showed a good current, the others variable.

Room I.

The warm air current had a velocity of 245 feet per minute, equivalent to 18 cubic feet of air per minute per pupil, or 1,080 per hour. The cold air current, like that in one of the rooms at the Whipple school, showed a greater velocity than the warm air current, to wit,

260 feet per minute, giving 19 cubic feet of air per minute per seat in this room, or 1,140 per hour. The results may be summarized as follows:

ROOM.	Pupils.	Warm air per hour per pupil.	Cold air per hour per pupil.
		cubic feet.	cubic feet.
F.....	43	900	840
I.....	48	1,080	1,140

Some subsequent measurements of the air currents, made by Dr. J. J. Berry, give substantially the same results as given above.

As will be observed the investigations made by this Board are by no means exhaustive, and embrace only a few of the schoolrooms of these buildings; but we deem the results sufficient for at least a preliminary.

Following is the report of Prof. E. R. Angell, upon the samples of air collected at the time by him:

ANALYSIS OF AIR.

The samples were collected in the Farragut and Whipple school buildings at Portsmouth, Friday, April 17, 1891.

Pettenkofer's test gave the following results:

Farragut School.

Time of day, 3-3.30 P. M.

Room H, Grades 4 and 5.—Attendance 40. Temperature, 72 degrees F. Parts of CO₂ per 10,000 parts of air, 13.2

Room F, Grades 8 and 9.—Attendance —. Temperature, 69 degrees F. Parts of CO₂ per 10,000 parts of air, 31.8.

Room B, Grades 5 and 6.—Attendance 35. Temperature, 66 degrees F. Parts of CO₂ per 10,000 parts of air, 33.7

Whipple School.

Time of day, 3.45-4 P. M.

Room H, Grades 8 and 9.—Attendance 41. Temperature, 68 degrees F. Parts of CO₂ per 10,000 parts of air, 18.5.

Room G, Grades 6 and 7.—Attendance 37. Temperature, 70 degrees F. Parts of CO₂ per 10,000 parts of air, 17.1.

A sample was taken from Room A, but the bottle containing it was accidentally broken. All the rooms have the same seating capacity, 46.

(Signed)

EDMUND R. ANGELL.

From our investigations and the evidence presented we arrive at the following conclusions :

1st. That in both the Whipple and Farragut schools some, and probably all, of the rooms are insufficiently ventilated.

2nd. That in both the Whipple and the Farragut schools, especially the latter, the present system of heating is inadequate in the coldest weather.

3rd. That the "dry closet," so called, under the conditions existing at the time of examination, is defective, and liable to endanger the health of the pupils and teachers.

Inasmuch as the system of heating and ventilation was at the time of inspection being operated at its greatest capacity, we cannot see how it is to be improved sufficiently to meet the requirements of health and comfort without very radical changes. While there are several ways by which the desired results can be secured, we would recommend the following :

1. To abandon the several furnaces now in use, and substitute in each building one furnace and boiler, with coils for steam and fan blower combined. This system could be easily connected with the present flues without any material alterations, and would ensure at all times an ample amount of heat and fresh air. The steam coils and blower would occupy only a small space adjacent to the boiler, and no piping of the building would be necessary. The cost would probably be less than that of any other plan that would assure from the start satisfactory results. This system is in successful operation in buildings that could not be properly heated and ventilated by the Smead plan.

2. We would unqualifiedly condemn, as contrary to the best principles of sanitation, the so called "dry closet," and wherever sewers can be reached and water-carriage employed, the "dry closet" should not be allowed. If the Smead system of heating and ventilating is to be used, it should be divorced from the "dry closet" attachment. The theory of the system is admirable, but practically it is faulty and dangerous under some circumstances and conditions.

Finally, we would respectfully suggest that the conditions found at both the schools mentioned are serious and demand an immediate

remedy. The good health and welfare of the children are dear to every parent, indispensable to every child, and invaluable to the greatest prosperity of the commonwealth.

Respectfully submitted,

IRVING A. WATSON, *Secretary*.

VENTILATION OF THE STATE HOUSE.

The almost intolerable condition of the air in the Representatives hall during the session of the last Legislature—the first winter session—caused the enactment of a resolution by that body requesting this Board to investigate and report upon the matter. A full record of the action of the Legislature and of the Board upon this subject is given in the following report made to that body in April last.

To the Honorable Senate and House of Representatives:

The following concurrent resolution, passed by the House of Representatives and the Senate, was submitted to the State Board of Health March 16, 1891:

Resolved, That the State Board of Health be and is hereby requested to carefully investigate the existing methods of ventilating and lighting the hall of the House of Representatives, and that the said Board be also requested, if in their judgment they deem it advisable, to formulate plans for the better ventilating and lighting of said hall, report thereon to be made to the present Legislature, with estimated cost of the necessary changes and improvements.

In accordance with the above resolution the Board immediately commenced an investigation of the matter under consideration, and secured the services of an expert sanitary engineer to assist in reaching definite conclusions and in formulating plans for a satisfactory system of ventilation.

Owing to the probable early adjournment of the Legislature and the consequent very limited amount of time in which to consider the matter, it is impossible to make more than a preliminary report at this time.

The present ventilation of Representatives hall consists of a certain small amount of air which enters the hall through the doorways,

and a somewhat larger amount which passes out through the two openings in the ceiling. This circulation of the air has very little value as a means of ventilation, inasmuch as the amount of air entering and leaving the room is altogether too limited in quantity, neither is the incoming air properly mixed with the vitiated air of the room. Furthermore it is probable that a large proportion of the air passing out at the ceiling enters at the gallery doors and does not assist in the ventilation of the hall. A careful measurement of the hall shows that with every representative in his seat and an average attendance in the gallery, there is still ample cubic space for each individual, if a sufficient amount of warmed, pure air is introduced, which it is perfectly feasible to do.

The outside atmosphere contains about four parts of carbonic acid gas to each 10,000 parts. Air that is breathed into the lungs is relieved of a part of its oxygen and when exhaled contains a larger proportion of carbonic acid. The carbonic acid indicates the relative amount of organic matter contained in a given atmosphere, and is thus regarded as a test of the amount of poisonous matter present in the atmosphere, exhaled from lungs, skin, etc. If we assume that ten parts of carbonic acid per 10,000 parts is the safe limit, then it only becomes necessary to determine how much fresh air must be supplied to limit it to these figures.

After a careful study of the room in question and the amount of air supplied by the door openings—which are very often closed—it is estimated that the atmosphere of the hall, under the existing circumstances, becomes vitiated to an unhealthful degree in about thirteen minutes. And when to this is added the amount of air exhausted by gas burners on dark afternoons and evenings, it is believed that the air becomes unfit for respiration in about ten minutes. In order to keep the conditions of the air within the safety limit of healthfulness, it is estimated that it would be necessary to remove 10,000 cubic feet of air from Representatives hall each minute, basing the calculations upon a full attendance of members upon the floor and one hundred persons in the gallery.

The plan recommended by the Board consists of taking a supply of air from outside the building through an opening in the cellar wall into a chamber built of brick. The air is to be warmed by passing over a steam coil of 800 square feet heating surface, thence up through a flue to a chamber in the lobby, from which it will be delivered to the Representatives hall by an opening through the wall 25 inches by 168 inches, located just below the gallery.

A division in the basement chamber will allow the cold air to pass directly up the flue without coming in contact with the heater, or to pass through the heater, or be mixed in the flue, so as to deliver into the hall at any desired temperature. A mixing valve or damper is to be put in the cellar, so arranged as to be worked from the lobby, which will regulate the temperature of the incoming air without reducing its volume.

The warm air comes through the opening in the wall at an angle of about 50 degrees and is thrown across the top of the room. The three windows on each side condense the air coming in contact with them and will therefore cause a constant flow toward them of the air from the top of the room. The exhaled air will rise and mix with the incoming fresh air so as to be thoroughly diluted. After losing a few degrees of heat the air will drop to or near the floor. Thus it will be seen that we have a stratum of cold and impure air near the floor which would have to be removed. In removing so large a quantity of air (10,000 cubic feet per minute), it is advisable to take it from several points in order to avoid any uncomfortable draft. It is, therefore, proposed to take the foul air through six registers placed in the floor at the rear of the seats, dividing the length of the room about equally.

The air passes through these registers into a duct under the floor and thence to one corner of the room, where it passes through the wall into a duct built in the lobby, thence up through the end of the gallery and into the attic room. It is proposed to build a chamber across the attic to the stairway already built, thence by the stairway and a duct of equal capacity into the well where the spiral stairway now is, and by this well to the top of the dome, discharging by the upper window openings, after the windows and casings have been removed to give full size.

The gallery will have a duct at one end adjacent to the main room flue, and also one at the rear, this being advisable on account of the great length as compared with the width.

There is a flue already constructed, connecting the basement with the space under the hall floor, but this would have to be enlarged in order to allow the passage of a sufficient quantity of air.

Many parts of the building are exceedingly inflammable, hence it would be necessary to have all the ducts lined with galvanized tin, as a spark from a burning match or cigar might be rapidly sucked into them. The entire plan is not only feasible, but owing to the height of the outgoing flue, complete and satisfactory ventilation is absolutely

assured. The old flue above mentioned is utilized in the plan proposed, and the entire system can be put into operation with comparatively slight disturbance to the building. Indeed the building is so constructed that the plan can be carried out with great practicability.

The Board is now having made accurate plans and specifications, but cannot at this time give a reliable estimate of the cost. These plans and specifications will be ready in a very short time for such disposition as the Legislature may determine upon.

Complaints which have been made to the State Board of Health during the present session of the Legislature, by many of the representatives, indicate that many have suffered from headaches, general lassitude, nervous irritability, and other conditions more or less induced by insufficient and impaired ventilation. Other conditions quite serious have been complained of, and the Board deems it a public necessity that better ventilation should be secured for Representatives hall. We therefore present the following conclusions:

1st. That the ventilation of Representatives hall is entirely inadequate under the present conditions.

2nd. That complete and satisfactory ventilation can be secured at a reasonable cost and without detracting from the beauty or convenience of either hall, corridors, or rotunda.

In view of these facts we would respectfully recommend that the Governor and Council be authorized to construct, out of any moneys in the treasury not otherwise appropriated, a system of ventilation for Representatives hall, according to plans and specifications recommended by the State Board of Health.

Respectfully submitted,

IRVING A. WATSON,

Secretary.

As a result of the foregoing report the following (chapter 124, Laws of 1891) was enacted:

Resolved by the Senate and House of Representatives in General Court convened:

That the Governor and Council be authorized to construct, out of any moneys not otherwise appropriated, a system of ventilation for Representatives hall and Senate chamber according to plans and specifications recommended by the State Board of Health, or such other plan as they may see fit to adopt.

[Approved April 11, 1891.]

AN IMPORTANT DECISION ON A SLAUGHTER-HOUSE NUISANCE.

A slaughter-house situated in the town of Littleton, and which for several years had given offense to people residing in its vicinity, was effectually suppressed by injunction. Whenever there are difficulties standing in the way of a prompt abatement of such nuisances by the local board we would recommend a procedure like the one taken in the case cited. Below is given the decree of the court in the case :

GRAFTON SS. IN THE SUPREME COURT. MARCH TERM, 1891.

LORENZO D. COCHRANE *v.* DEAN C. PHILLIPS.

PETITION FOR INJUNCTION.

DECREE.

The said petition having been duly filed in the office of the clerk of said court at Woodsville in Haverhill in said county on the thirtieth day of March A. D. 1891, and the petitioner having been ordered to notify the said Dean C. Phillips to appear before said court at Thayer's hotel in Littleton in said county on the 20th day of April A. D. 1891, at 4 o'clock in the afternoon, then and there to answer to said bill of complaint by giving in hand or leaving at the usual place of abode of said Phillips a true and attested copy of said bill and the order of court thereon, at least fourteen days before said time of hearing : and said order of notice having been duly complied with by said petitioner, and both the said parties having appeared in person at the time and place aforesaid with their evidence, witnesses, and with their solicitors : and the parties, the witnesses and other evidence, and the suggestions of counsel having been heard and considered by the court.

It is ordered and decreed that the slaughter-house complained of and described in said petition, is a nuisance, and that it be abated : that the further use of the said buildings of the said Phillips described in said petition as a slaughter-house be discontinued, that there be no deposit of animal and vegetable matter liable to decay and become offensive, or the refuse of slaughter-houses and of the butchering on or about said premises : that swine shall not be kept or pastured in or about said buildings in such numbers or in such manner as to cause odors of-

fensive to persons dwelling in the vicinity thereof, or to make the waters foul in the stream described in said petition: that the said Phillips remove the manure, refuse and animal matter under and about said slaughter-house, which is liable to make the atmosphere offensive or to foul said waters, and that he make no other use of the premises which shall make them offensive to those dwelling in the vicinity on account of foul odors, or which shall make said waters foul and unwholesome: that the said Phillips shall not suffer or permit his agents, employees, servants, or lessees to do anything on the premises or make any use thereof contrary to the orders aforesaid: and that the said Phillips pay the plaintiff's costs taxed at twenty-seven dollars and seventy-seven cents, and the cost of the copy and service of this order.

April 20, 1891.

W. H. H. ALLEN,
Presiding Justice.

STATE OF NEW HAMPSHIRE.

GRAFTON SS. SUPREME COURT CLERK'S OFFICE, April 29, 1891.

The foregoing is a true copy of the decree in the before entitled cause.

In witness whereof I have hereunto set my hand and affixed the seal of said court.

CHAS. B. GRISWOLD, *Clerk.*

THE PREVENTION OF TYPHOID FEVER.

SOMETIMES CALLED "ENTERIC FEVER," "GASTRIC FEVER,"
"PYTHOGENIC FEVER," "CESSPOOL FEVER," ETC.

Typhoid fever is one of the preventable diseases, and sanitarians and physicians very generally agree that there is no excuse for its existence in any community. This opinion is based upon the fact that intelligent and well-directed efforts to restrict the disease are attended with most successful results, thereby proving that the laws through which it operates are well understood by those who have studied the subject and that the disease is capable of being controlled by proper measures.

On an average, about 150 deaths are annually reported in

this State as having occurred from typhoid fever. This mortality represents from 1,200 to 1,500 cases of the disease annually. A large proportion of this mortality can and ought to be prevented.

The greatest number of deaths from this disease is of persons in the prime of life, and this should prompt to greater efforts for the prevention of the disease. Persons of all ages are liable to it, and although it may appear in a mild form in many instances, yet such cases may be the medium of communicating the disease in a fatal form to others. Although it is not one of the most contagious diseases, *it is communicable to others.*

It is not considered directly transmittible from the sick to the well, but the patient eliminates from his person, chiefly through the excreta, the germ which produces the disease. The germ will soon perish if not placed under conditions favorable to its development; but any mass of decomposing organic matter, such as cesspools, filthy drains, damp and unclean cellars or rooms, etc., and filth in any form, affords a fertile soil for the reproduction of the typhoid fever germ. Hence it follows that privy vaults, cesspools, filthy drains, etc., become centers of contagion, and dangerous localities when typhoid fever is prevalent. The danger from them is vastly increased, because the fluid portion of their contents, charged with the germs of disease, permeates the soil and is often carried by underground water currents to neighboring wells, which in this way become poisoned. If there is any weight in the testimony of close observers and careful investigators, then the evidence is overwhelming that typhoid fever is a filth disease. So general is the belief that filth in some form is necessary to support this disease, that its very name suggests uncleanness, defective sewerage, bad drainage, foul vaults and cellars, filthy sink drains, contaminated drinking water, etc., etc.

The poison of typhoid fever may possibly sometimes be inhaled into the system, but in the great majority of cases the disease germ undoubtedly finds its way into the intestinal

canal by means of the food and drink. Reflection will show, and experience teaches, that there are many ways in which our food and drink may become contaminated with the germs. Some of the more frequent ways are these: The discharges are thrown into the privy or upon the ground, whence they soak, sometimes long distances, through the soil into the family well. The soiled clothes of the patient are washed, and the water carried by a loose and leaky drain which runs too near the well. Some kinds of food and drink are very absorptive of disease germs, and being kept too near the patient, become contaminated. Cases are known where milkmen, with fever at their own homes, have caused serious outbreaks of the disease among their customers, by keeping the milk, before it was distributed, too near the sick, by diluting it with contaminated water, or even by rinsing the cans with such water.

PREVENTION.

1. Keep your premises at all times in a good sanitary condition. Filth is the *nidus* in which the cause, or germ of the disease may be developed. Of all forms of filth none others are so dangerous to our homes as the "hole-in-the-ground" privy, and the sink drain. The former should never be tolerated, nor the latter, either, in its usual forms.

Filth in its sanitary signification, includes not only the grosser forms but also the less tangible and more *respectable* kinds which are too often ignored. The impalpable but not inodorous air of unventilated bedrooms is disgusting and dangerous; the sewer-air which leaks from faulty water-closets or defective drain pipes in the homes of the wealthy consigns many to the tomb; the emanations from rotting chips or sawdust; the exhalations from decaying vegetables in the cellar,—all these may dangerously pollute the air, and should be avoided.

2. All discharges from the fever patient should be received in a vessel containing a pint or more of Solution No. 1, and kept covered by the disinfectant three or four hours, and then

buried in the earth where they cannot by any possibility find their way into wells, springs, or brooks. *They should never be allowed to mingle with any kind of filth, in a privy or elsewhere.*

The clothing, both of bed and patient, should be disinfected by dropping it into a tub containing several gallons of Solution No. 2, and should be kept therein until it can be boiled. After death or recovery disinfect the room by sulphur fumigation followed with washing the floors and other woodwork with Solution No. 1, or No. 2.

3. As far as concerns the personal hygiene of nurses and attendants, it may be said that, if the foregoing preventive measures are carefully carried out, there is hardly a possibility of their taking the disease; in fact, under such conditions, cases in which the attendants have taken the disease from the patient are almost if not quite unknown. Typhoid fever goes through families because all have been exposed to the disease-producing cause; or the first cases contaminate the water supply, or "seed down" the privy-vault and the house surroundings with the disease germs.

Nurses and others in the family should eat nothing in the room where the patient is, nor anything which has been there. The food for the attendants and family should be prepared and kept as far from the sick as possible. Thorough boiling will kill all disease germs; so, while the fever is in the house, it is safer to boil all water and milk just before it is used.

Bodies of those dead from typhoid fever should be wrapped in a cloth wet with either Solution No. 1, or Solution No. 2, and at once buried.

The room in which there has been a case of typhoid fever, whether fatal or not, should, with all its contents, be thoroughly disinfected by exposure for twenty-four hours to strong fumes of burning sulphur immediately after it has ceased to be occupied by the patient, and then it should for several hours, if possible for days, be exposed to currents of fresh air.

Upon the discovery of a case of typhoid fever by the attend-

ing physician, he should immediately notify the local board of health and should coöperate with the board to restrict the disease. Upon receiving such notice the local board of health should :

1. Give public notice of infected places, so that no person may unguardedly drink water or take food from a source likely to be contaminated or unduly expose themselves to the disease.

2. Investigate the probable source and mode of origin of the disease. If probably from a contaminated well or general water supply, see that measures are taken by stopping its use, by boiling it, or otherwise to prevent further cases being caused in the same manner. If connected with the sewer, see that the plumbing is in good order and all fixtures properly trapped.

3. Order and enforce the disinfection of all discharges from the bowels of patients sick with typhoid fever. It is safest that the discharges of all persons who have diarrhœa shall be disinfected.*

4. Disinfect the contents of the privy on the premises, or any other that has been used by the patient.†

5. Order and secure the disinfection of all articles of clothing or bedding that have been soiled by discharges from the patient.

6. Secure the coöperation of the people in the prevention of this disease, by teaching them its modes of spreading, the best methods for its prevention, and the greater importance of efforts for its prevention in times of drought and low water in wells.‡

7. See that the premises are properly disinfected after the death or recovery of the patient.

* For this purpose use disinfectant No. 1 freely.

† To keep a privy-vault disinfected during the progress of an epidemic, sprinkle chloride of lime freely over the surface of its contents daily, or use a quart of Solution No. 1 daily.

‡ Wells are more dangerous at times of low water, because the area of drainage to the well is greatest when the water is the lowest.

DISINFECTANTS.

*Solution No. 1.**

Chloride of lime (bleaching powder),	.	.	.	one pound.
Water,	.	.	.	four gallons.
Mix.				

All clothing or bedding soiled by the patient's discharges, must be removed *at once, and placed in boiling water, to be boiled for half an hour*; or they may be immersed in the following solution, allowing them to remain for two hours, when they may be rung out and sent to the laundry to be thoroughly boiled:

Solution No. 2.

Sulphate of zinc,	.	.	.	.	one pound.
Common salt,	.	.	.	.	one half pound.
Water,	.	.	.	.	four gallons.

Nurses and attendants should observe perfect cleanliness, and their hands should be frequently bathed in Solution No. 2.

Fumigation with Sulphur

has ever been regarded as a reliable method of disinfecting a house, and should be resorted to after a case of small pox, diphtheria, scarlet fever, or typhoid fever, and in such other cases as the attending physician may think best. To do this, the house must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with solution, should be opened and exposed during fumigation, as follows: Close the room as tightly as possible, place the sulphur in iron pans supported by bricks placed in wash-tubs containing a little water, set it on fire by hot coals or with the aid of a spoonful of alcohol, and allow the room to remain closed for twenty-four hours. For a room about ten feet

*For a free and general use in privy-vaults, sewers, sink drains, refuse heaps, stables, and wherever else the odor of the disinfectant is not objectionable, this is one of the cheapest and most effective disinfectants and germicides available for general use.

Chloride of lime ought to be obtained anywhere for ten cents a pound. In some places it can be obtained for five cents a pound.

This is one of the best disinfectants known.

square, at least three pounds of sulphur should be used; for larger rooms, proportionally larger quantities. Heavy woolen clothing, silks, furs, stuffed bed covers, beds, and other woolen articles, which cannot be treated with disinfectants, should be hung in the room during fumigation, their surfaces thoroughly exposed, and their pockets turned inside out. Afterward they should be hung in the open air, beaten and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, etc., should be cut open and their contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but they should afterward be removed to the open air and thoroughly beaten.

REMARKS.

Disinfection, following every infectious or contagious disease, should be carried out under the supervision of the local board of health, or by some competent person authorized by the board. Much of the so called disinfection practiced by many families is wholly inefficient and useless. The odor of burning coffee, tar, sulphur, or any other substance in the sick-room, or other part of the house or premises, in the presence of the patient, or other persons, operates only as a deodorizer, and does not destroy the germs of the disease. This is an important fact that every family should understand.*

CAUSES OF TYPHOID FEVER.

Typhoid fever is perhaps more than any other disease dependent upon unsanitary conditions for its prevalence. We have repeatedly shown this fact in the former reports of this Board. The testimony of the physicians in this State year after year adds home evidence to the extensively recorded causes of this disease. All the records of typhoid fever epidemics in this country and elsewhere abound with the most

*The foregoing paper is issued in pamphlet form by the State Board of Health for gratuitous distribution throughout the State. A copy may be obtained by applying to the Board.

incontrovertible proofs that filth, so called, in some form is the important factor in the spread of this disease. At the last meeting of the Sanitary Institute of Great Britain, Dr. George Vivian Poore presented the record of the reported epidemics of typhoid fever in England for thirty years, and the facts are so overwhelming in proof of a filth cause, that we give the record complete. The lesson it teaches is applicable to every community and to every home in New Hampshire.

CAUSES OF TYPHOID FEVER.

In 1858, at Windsor, 400 infected; 26 deaths. Slovenliness as to removal of filth; offensive pig-sties; unregulated slaughter-houses; unremoved refuse; obstructed surface drainage. Three fifths of the houses supplied from surface wells, sometimes in proximity to undrained premises, or imperfect drains. Sewerage without adequate exterior ventilation, and so ventilating itself into houses. On account of the summer drought, the sewer atmosphere at maximum of poisonousness.

In 1859, at Kirkby-Stephen, one seventh of the 1,500 inhabitants infected; 11 deaths (Typhoid or Typhus?). Bad drainage. Sewerage draining into drinking-wells. Accumulation of excrement in proximity to houses.

In 1859-60, at Bedford (autumnal epidemic for some years), 30 deaths per annum from fever and diarrhœal diseases. Water contaminated with decaying animal matter. Cesspools universal—upwards of 3,000 of them. Water supply from wells frequently in close proximity with cesspools. Water both in cesspools and wells rises and falls with river.

In 1860, at Bath (Bathwick), 35 houses infected. No sewerage. Cesspools general. Defective house drains leaking beneath houses. Fæcal putrefaction in air and drinking water.

In 1859-60, at Kingston-Deverill (Wilts), 66 (out of population 400) infected; 6 deaths. First contagium imported. Badly-ventilated houses. Not attributed to sewage-tainted water or sewage-tainted breathing air; probably to want of precaution in dealing with evacuations.

In 1859-60, at Dronfield, 556 (out of 2,500 inhabitants) infected; 41 deaths. Sanitary neglect. Accumulation of animal filth in privies, cesspools, pig-sties, slaughter-houses, and drains. Drainings

soaking through house walls. Refuse draining itself to dammed-up brook in valley; two much-frequented wells habitually in danger of pollution from this brook.

In 1861, at Calstock (Gunnislake), 213 infected; 12 deaths. Accumulation of excrement, slops, and decaying animal and vegetable matter. Deficient privy accommodation. No efficient house drains or sinks. An unusual number of filthily-kept pigs and of putrid and overflowing refuse pits and heaps.

In 1861, at Over-Darwen, 1,000 infected; 35 deaths (some of these registered as "Typhus"). No system of drainage, or of scavenging. Night soil, ashes, and general refuse allowed to accumulate for months and years. Overcrowding. Water and liquid refuse making for themselves channels in the unpaved streets.

In 1861, at King's Langley, 16 infected; 2 deaths. Drains opening near cesspools pass between or beneath houses; in hot weather offensive stinks proceed from these drains. Drinking-wells in danger of contamination from cesspools. Filth and excrement allowed to accumulate from deficient scavenging.

In 1861, at Yeadon, 130 infected; 11 deaths. Deficient privies and deficient scavenging. Drains communicating with dam whence water is pumped to mills, and there boiled for trade uses. Open gutters, into which slops are thrown. One drinking-well liable to sewage fouling.

In 1863, at Whitehaven, 1,000 infected; 110 deaths (including 17 registered in St. Bees). Overcrowding. Bad ventilation of houses. Bad privy accommodation. Bad scavenging. Practically no drainage. Absolutely none for water-closets. Gutters running down courts carry off surface water, and whatever else may happen to escape from middens, piggeries, etc., or be thrown therein.

In 1863, at Festiniog, 600-700 infected; 67 deaths. Great majority of houses without privies or ash-pits. Fields and house utensils are used — the latter being emptied near the houses. Streams in valleys polluted by rain water washing down excrement from houses. This water supply only used for domestic and not drinking purposes. Drinking water from mountains free from pollution. Great overcrowding. Cold and wet attributed as causes. Such privies as exist are generally offensive.

In 1863-4, at Grantham (including Spittlegate); 22 deaths. Impure water. The drinking water (spring water) became mixed with the river water. This latter receives part of the drainage of a village.

In most cases the effluvia from accumulated human excrement are blamed, from untrapped drains, imperfect sewers, and bad system of privies.

In 1865-6, at Buglawton, 150 infected; 14 deaths. Only superficial sewers, receiving rainfall, house slops, and in some cases midden excrement. Foul smells from untrapped sewers. Middens in common use, but scavengage very bad. The river dam receives the sewage of many houses, and from this river near where sewage enters, water for domestic use is obtained. Drinking water from well liable to contamination from privies adjacent. Water analysis proves the contamination. "Facts point to specific contamination of the well water by typhoid poison, derived from the first patient in the house adjacent to the well."

In 1864-5-6, at Tottenham (Page Green), 100 infected; 2 or 3 deaths. Where fever occurred, the drinking water was wholly or in part from surface wells. Some of these wells liable to surface and sewage contamination. Water analysis showed organic impurity.

In 1865-6, at Winterton, 100 infected (ex. 145 inhabitants); 17 deaths. In 1867, 55 infected; 6 deaths. Disgraceful state of privies, cesspools, ash-pits, and wells. Contents of privies running into gardens, often penetrating into wells. Refuse, slops, urine thrown into yards, or deposited into open cesspools. Urine and bowel discharges of typhoid patients thrown into open ash-pits. These sources of fæcal fermentation situated close to the houses, and in immediate vicinity of wells. Untrapped drains communicating with main sewer evolving stinking effluvia. Within a circuit of fourteen feet round a drinking-well are an open drain, an open ash-pit, two pig-sties, three privies, and one open cesspool, all (except the drain) raised from one and one half to three feet above the well, and situated on a loose porous soil.

In 1867, at Guildford, 500 infected; 21 deaths. Sewer receiving mainly surface water, receives excreta from certain water-closets, and the overflow of certain cesspools; some privies also discharge their liquid excreta into this sewer. Sewer runs within ten feet of well, and by percolation and by a fissure in the chalk, excrementitious matter leaked from the sewer to the well.

In 1867, at Terling, 300 infected (ex. 900 inhabitants); 41 deaths. Slops, ashes, manure-heaps, broken-down privies and cesspools surround the cottages; drinking water is obtained from wells at a lower level, and separated by loose porous soil from the above nuisances.

The remaining drinking water is got from ponds into which drainage from the fields and roads run, or from river water contaminated by sewage. Overcrowding everywhere.

In 1869, at Wicken-Bonant, 45 infected; 4 deaths. Privy of first house affected with typhoid stands on edge of water channel; the undisinfected stools were thrown into the privy; thus the excrement got from privy to brook, and the brook communicated with the parish well. The method of infection in the first patient is uncertain, but was caused in some manner by typhoid fever previously imported from London.

In 1870, at Annesley (Notts). Arrangements for excrement disposal and water supply such that people must drink their own excrement.

In 1870, at Appledore and Northam (Devon). Streets and courts ill-constructed and ill-drained, with excrement and refuse lying about everywhere. Water sources befouled. "Epidemics of enteric and scarlet fevers."

In 1870, at Coventry (neighborhood of). "Enteric fever seriously prevalent." Ascribed to use of polluted water, want of efficient sewerage, and various accumulations of filth.

In 1870, at Croyde (Devon). "Serious prevalence of enteric fever." No public sewerage or house drainage. Excrement and refuse accumulations. Pig-sties and dung-heap nuisances, sometimes polluting the water.

In 1870, at Penryn (Cornwall). "Considerable outbreak of enteric fever." Streets lined with excrement and refuse. Want of sewers, privies, and ash-pits. Water sources polluted.

In 1870, at Rolvenden (Kent). "Enteric fever epidemic." Water supply polluted. Want of drainage and proper means of excrement disposal. Abundant nuisances.

In 1870, at Spinkhill (Derbyshire). "Habitual prevalence and present outbreak of enteric fever." Water of public and other wells polluted. Drains defective. Want of privies and ash-pits. Filth accumulations.

In 1870, at Ystrad-y-fodwg (Glamorgan). "Great prevalence of enteric fever." Neglect of all sanitary precautions. No due provision for excrement or refuse disposal. Water supply insufficient and liable to pollution.

In 1871, at Brackley (Northampton). "Epidemic of typhoid." Accumulation of excrement. Wells near cesspools.

In 1871, at Bulwell (Notts). "Epidemic of typhoid." Pollution of water by excrement nuisances. Privies filthy and insufficient.

In 1871, at Burbage (Leicestershire). Epidemic of typhoid fever, connected with use of water from a well communicating with a privy probably infected by an imported case of typhoid. Bad excrement management, and improper water supply generally.

In 1871, at Calstock (Cornwall). Frequency of typhoid epidemic. Continuance of unwholesome conditions previously reported. (*Vide* 1861.)

In 1871, at Carlton (Notts). "Enteric fever epidemic." No proper water supply. Privies few and bad. Nuisances abounding.

In 1871, at Helions-Bumpstead (Essex). "Epidemic enteric fever." Great accumulations of excrement and filth. Foul ditches. Much of water supply polluted.

In 1871, at Higham-Ferrers (Northampton). "Habitual prevalence of enteric fever." Ground sodden with leakage from privy pits and cesspools. Water polluted. Insufficient ventilation of sewers. Accumulations of excrement and house filth. Trade nuisances.

In 1871, at Hugglescote, Donnington, Coalville, Packington (Leicestershire). "Enteric fever severely epidemic." Air and water polluted by excrement. No proper drainage. Nuisances from privies and pig-sties.

In 1871, at Ilminster (Somersetshire). "Considerable epidemic of enteric fever." Foul open sewers. Excremental filth everywhere, saturating ground and contaminating most of drinking water.

In 1871, at Packington (Leicestershire and Derbyshire). "Severe epidemic of enteric fever." Water supply polluted. Serious accumulations of excrement and other filth.

In 1871, at Sunderland. "Epidemics of typhus, typhoid, and small pox." Overcrowding. Defective drainage. Improperly regulated water-closets. Excremental nuisances. Defective water supply.

In 1872, at Ashton-in-Makerfield (Lancaster). "Epidemic of typhoid fever." Insufficient water supply, and partly from questionable sources. House drainage bad. Accumulations of excrement. Want of scavenging.

In 1872, at Sherborne, 243 infected. Water in surface mains exposed to contamination from water-closets by excrement and sewer air. In some cases the specific contagium of typhoid would thus enter the water pipes. This entrance to the water pipes was made possible on account of the water supply being itself shut off near the supplying reservoir. Water-closets defective; filthy privies in the town with large pits, producing soil saturation and air pollution. Inefficient sewerage and drainage. Overflow of bath pipes (in some instances)

communicating with soil pipes or drains. Remains of old sewers and dead wells in the town evolving foul smells. Public water supply good, but in addition several wells exist in the town exposed to contamination from soil of privy pits or leakage from old sewers.

In 1872, at Armley, 107 infected; 11 deaths. Defective drainage. Large privy cesspools the usual thing. The earth upon which the dwellings stand is polluted with soakage from drains and cesspools. Typhoid first attacked dairyman and then spread to a large number of his customers. His well was found to be extensively contaminated with sewage.

In 1872, at Abingdon. Water supply mostly from surface wells in porous soil soaked with excremental and other filth. Sewerage defective. Sub-soil in part water-logged. Privy and water-closet nuisances. Accumulations of excrement. "Enteric fever and diarrhoea."

In 1872, Burton-Latimer (Northampton). "Typhoid epidemic." Water supply obtained from wells polluted by soakage from privies and cesspools. Sewerage and drainage defective. Accumulations of excrement and refuse. Nuisance from piggeries. Overcrowding.

In 1872, at Huddersfield. "Typhoid epidemic." Sewers defective. Certain water supplies largely polluted with sewage.

In 1872, at Leigh (Lancashire). Privy accommodation insufficient. Polluted water used from wells close to drains, privies, and middens. Accumulations of excrement. Imperfect sewers. Badly constructed and arranged houses.

In 1872, at Olney (Bucks). "Constant prevalence of enteric fever." Imperfect drainage. Soil round wells sodden with soakage from privies. Cottages without privies or ash-pits. Accumulation of excrement.

In 1872, at Swinton (Yorks). "Enteric fever endemic." Soakage of excremental filth into wells. Accumulation of excrement and filth.

In 1872, at Wellington (Somerset). Water liable to pollution. Imperfect sewerage and drainage. No system for removal of refuse. Nuisances from manure, pig-sties, and slaughter-houses.

In 1872, at Whitchurch (Hants). "Enteric fever." Water obtained from wells sunk in porous soil saturated with sewage. No proper sewerage system. Nuisance from piggeries.

In 1873, at Wincanton (Somerset). "Continued prevalence of enteric fever." Foul privies and drains. Air and soil polluted by sewage. Cesspits. Water supply from reservoir polluted.

In 1873, at Brecknock. "Enteric fever." Defective drainage. Cesspits leaky and rarely emptied; pollution of soil water. Badly-constructed privies. Nuisances from animals, and from accumulations of manure.

In 1873, at Littleport. "Typhoid fever endemic." Water supply insufficient and in part polluted. Nuisances from cesspools, privies, and imperfect drainage. Accumulations of excrement.

In 1873, at Tottenham. Ill-designed cesspools in parts not sewered. Water supply contaminated with decaying animal refuse. Water-courses and ditches used as sewers. Large deposit of sewage mud at sewage works. Effusion of sewage on lower parts of village due to a flood. Escape of sewer air into the houses on the higher levels.

In 1873, at Moseley and Balsall Heath, 96 infected; 10 deaths. Porous soil extensively polluted by soakage from dumb wells, bad drains, and ash-pit privies. Wells supplying water for domestic use polluted with sewage or excremental matters. Typhoid fever broke out at a dairyman's; fever evacuations were here thrown into the privy; by soakage, excrement from this privy polluted two wells. Thence infection was borne *via* the milk to the customers. "Suds" in which infected clothing had been washed, afterwards polluted well water, from the use of which fresh outbreaks were traced.

In 1873, at Marylebone, 244 infected; 26 deaths. Due to infected milk supply, obtained from a farm near Chilton. The owner of this farm died of typhoid fever, his evacuations being buried, without disinfection, where they found their way into well water used for dairy purposes. Defects in sewerage and drainage were also discovered in the affected houses.

In 1873, at Combroke (Warwickshire). Typhoid imported from Leamington, and spread to adjoining houses. The water much used in these houses was obtained from a well exposed to pollution. Privies in village imperfectly constructed.

In 1873, at Caius College (Cambridge), 15 infected (12 being in Tree Court). Excremental contamination of a particular section of the college water service.

In 1873, at Guisborough (Yorks). "Serious prevalence of typhoid." Water polluted from privy and refuse nuisances. Imperfect scavenging. Ill-built and overcrowded houses.

In 1874, at Baldock (Herts). "Outbreak of enteric fever." Polluted water. Air fouled by sewer emanations. Water-closets

without means of flushing. Accumulation of house refuse. Overcrowding.

In 1874, at Chippenham (Wilts). "Typhoid epidemic." Water supply inadequate and polluted. Numerous and very offensive cesspits. Sewers and drains leaky. Refuse heaps and pig-sties near to dwellings.

In 1874, at Godalming. "Constant prevalence of enteric fever." Wells close to cesspools. Imperfect sewerage. Excremental accumulations.

In 1874, at Truro. "Outbreak of typhoid." Entrance of foul air from sewers into dwellings. Water supply exposed to pollution. Defective sewerage. Insufficient privy accommodation and scavenging. Trade and pig-sty nuisances.

In 1875, at Chatteris (Cambridge). "High rate of mortality from fever." Privy pits in a porous soil and not water tight. Wells often close to privy pits, from which there is soakage into soil.

In 1874, at Auckland (Durham). "Extensive prevalence of enteric fever." Polluted water. Imperfect sewerage and drainage. Insufficient privy accommodation. Filth nuisances. Overcrowding.

In 1874, at Bourton-on-the-Water (Gloucester). Polluted water supply. Defective drainage. Privy nuisances.

In 1874, at Lewes (Sussex). Large epidemic of typhoid; due in first instance to pollution of town water supply by water drawn from the Ouse, which receives the town sewage, and spread by suction of polluting matter into the water pipes of an intermittent water service.

In 1874, at Over-Darwen (Lancashire). Large typhoid epidemic. Public water supply polluted by soakage and drain, into which excreta from enteric fever patient had passed, and in various other ways. River extensively polluted. Houses polluted by soakage from privies and cesspools. Gross neglect of scavenging. Accumulations of excrement. Sewerage system defective.

In 1874, at Lower Gornal (Staffordshire), 700 infected; 39 deaths "Severe outbreak of enteric fever." Absence of drainage. Accumulations of excrement. Foul privies and surface nuisances everywhere. Polluted wells, with sewage containing the specific contagium and excremental matter. Unwholesome cottages.

In 1875, at Croyden (parish of), 1,200 infected; 90 deaths. Escape of infected air from sewers, and its inhalation by persons susceptible of the disease. The air of sewers was "laid on" to houses. No evidence of the well water having been a vehicle of infection. Opportunities exist for the passage of infection from sewers into small

confined cisterns and water pipes, but water pollution played a much less considerable part than sewer air infection in this epidemic.

In 1875, at Northampton Lunatic Asylum. "Extensive outbreak of typhoid." Its extension due apparently to the defective state of the drains of the asylum.

In 1875, at Royton (Lancashire). System of sewerage defective. Privies dilapidated and overfull. Soil and air polluted by overflowing cesspools. No system of scavenging. Enormous masses of excrement deposited in the neighborhood by the Carbon Fertilizing Company. Overcrowding.

In 1876, at Chalvey (Bucks). Cesspools and wells intermingle in porous soil. Hand-flushed closets, sinks, and stop-drains in connection with cesspools. Excremental fouling of air, earth, and water.

In 1876, at Eagleley and Bolton. Simultaneous outbursts of enteric fever in Eagleley and Bolton, in connection with the milk service of a particular dairy. Dairy water obtained from a brook, the course and banks of which had recently been largely fouled by human excrement. Sewerage, drainage, and water supply arrangements deficient.

In 1876, at Great Coggeshall (Essex). Epidemic of typhoid spread in first instance through the agency of an infected milk supply, and subsequently through the generally defective sanitary arrangements of the town.

In 1876, at Llanelly (Brecon). "Continued prevalence of typhoid. Epidemic of typhoid at Darenvelling." Insufficient privy accommodation. Absence of sewerage and drainage. Accumulation of refuse near dwellings. Water supplies generally exposed to contamination. Unwholesome method of excrement removal.

In 1876, at Royston Rural Sanitary Dist. "Large mortality from enteric fever." Water supply in many villages very deficient and very foul. Ill-constructed and ill-managed closets. Sewerage and drainage, when present, sources of nuisance. Dwelling accommodation dilapidated and filthy.

In 1876, at Tideswell (Derbyshire). "Outbreak of typhoid." Spread of disease favored by conditions in an intermitting water surface allowing suction of foul air into water pipes. Sewerage defective. Closet accommodation insufficient and a nuisance.

In 1877 (1873-77), at Ascot, 69 infected; 2 deaths. Epidemic of enteric fever lasting, with occasional intermissions, for four and one half years. Found to have invaded, almost exclusively, families supplied with milk from one particular dairy farm, and to have spread mainly by the use of that milk. Drainage arrangements at dairy bad.

Water used for cleaning milk cans, and for other dairy purposes, inevitably polluted by emanations from drains, which also polluted the atmosphere of the dairy. Well water contaminated from cesspools, privies, dung-heap, etc. Specific infection of milk was also possible.

In 1877, at Bedale (Yorks). Outbreak of enteric fever following importation to the town of a case of that disease. Wells generally liable to pollution. Nuisances from midden privies, and from keeping of animals. Deficient drainage.

In 1877, at Bradford (Wilts). Epidemic due to use of water subject to constant risk of excremental pollution. Nuisance from common privies. Absence of means of drainage in one part of the town.

In 1877, at Padstow (Cornwall). Specifically infected sewer air. Excremental accumulation and defective arrangements for its removal. Insufficient water supply, and wells exposed to contamination. Dwellings dilapidated and unwholesome. Sewers insufficiently ventilated.

In 1878, at Dewsbury District. "Epidemic of typhoid in first quarter of 1877." Midden privies a source of great nuisance. Urine stored about houses for trade purposes. Water supply subject to pollution; supply intermittent and liable to be fouled by suction of filth into mains. Sewerage and drainage deficient. Water supply in some cases from polluted wells.

In 1878, at Gomersal (in Dewsbury District). "Extensive epidemic of typhoid in 1873." Wells liable to pollution. Sewerage defective. Foul air passing from sewers into houses. Disposal of excrement and refuse very faulty.

In 1878, at Thornhill (in Dewsbury District). "Large mortality from typhoid." Defective and polluted water supply. Sewerage and drainage facilitating escape of foul air into dwellings. Grave nuisance from excrement disposal.

In 1878, at Soothill-Nether. "Very large mortality from typhoid." Causes as described under "Thornhill."

In 1879, at Chichester. "Outbreak of enteric fever." Due to infected milk (no contamination traced unless it were in the use of water taken from polluted stream for washing the cow's udders). Drainage mostly into cesspools, often very near drinking-wells. Branch of stream receiving sewage foul and stagnant.

In 1879, at Newquay (Cornwall). "Serious outbreak of typhoid." Faults of drainage. Use of well water polluted with sewage. Prevalence of nuisances.

In 1879, at Redhill and Caterham (Surrey). 352 infected; 21 deaths. Epidemic limited to the consumers of the Caterham Waterworks Company's water. This water was contaminated by means of the evacuations of a man employed in the construction of an adit between two of the Company's deep wells, whilst suffering from an attack of unrecognized typhoid fever.

In 1879, at Selborne (Hants). "Outbreak of enteric fever," spread by polluted water and infected privies from an imported case of typhoid. Water supply from wells liable to pollution. Filthy privies. Excremental accumulations.

In 1879, at Wing (Bedfordshire). Epidemic of typhoid in a circumscribed area associated with the use of water from a well polluted by soakage from privies and drains. Excremental nuisances generally prevalent.

In 1880, at Aveley (Essex). "Outbreak of typhoid." Spread of fever due to sewage nuisances and polluted well water. Drainage entirely by cesspits, often in close proximity to houses. Well water exposed to excremental pollution. Scavenging neglected.

In 1880, at Blaby Sanitary District (Leicestershire). "Numerous outbreaks of typhoid." Due to drinking water from wells specifically polluted by soakage from infected privies. Also spread by infected atmosphere of privies and by milk. Accumulations of midden privy excrement. Wells exposed to pollution. Drainage either absent or defective.

In 1880, at Haverfordwest (Pembrokeshire). Origin of epidemic uncertain, but disease spread by sewer exhalations and polluted water. Sewers and drains faulty. Drain atmosphere escaping into houses. Ill-contrived water-closets indoors; offensive midden-steads close to houses. Excrement accumulation. Public water supply liable to contamination by sewer air. Water also obtained from polluted wells and streams. Nuisances from slaughter-houses and pig-keeping. Overcrowding.

In 1880, at Melton-Mowbray (Leicestershire). Due to infected sewer air. Unwholesome privies discharging into large and uncovered cesspits. Water supply from wells exposed to pollution. Nuisance from pig-sties, slaughter-houses and refuse accumulations. Sewers defective and badly ventilated.

In 1880, at Millbrook (Cornwall). Epidemic due partly to infected sewers, partly to polluted water supply, and partly to contaminated milk supply from a house invaded by the fever. Entrance of sewer

air into wells. Public and private wells polluted by excremental soakage.

In 1880, at Newlyn-East (Cornwall). "A sudden, extensive and fatal outbreak of enteric fever in an utterly neglected and filthy mining village." Water supply scanty and mainly from a well with which the village drain freely communicates. Epidemic partly due to the use of the well water, partly to privies and collections of filth subsequently infected, and partly to distribution of milk from infected houses.

In 1880, at Pemberton and Orrell (Lancashire). Extensive outbreak of typhoid during drought after heavy rain, probably due to polluted spring water. Water supply from rain-water butts, or from springs and surface wells exposed to pollution.

In 1880, at Southend (Essex). Considerable epidemic of typhoid at Prittlewell, due to use of polluted water supply. Great want of drainage, and aggravated nuisances from cesspit privies in the village. At Southend, drainage incomplete. Sewer ventilation imperfect or absent.

In 1881, at Blackburn, 266 infected (from January to June); 24 deaths (up to April 16th). Due to contamination of water supply by soakage from drain conveying discharges of a fever patient at Guide on line of conduit. Sanitary administration good. Old midden privies being replaced by tub privies and water-closets. Excreta taken by canal to manure works. Sewage utilized for farm irrigation; other refuse destroyed in furnace.

In 1881, at Bodmin Urban Sanitary District. "Severe epidemic in 1881." Original source not traced. Sewers and drains badly constructed, leaky, and unventilated. Water supply partly from springs and wells exposed to sewage pollution. Reflux of foul matters from closet into public water supply possible. Nuisances from surface filth and pig-keeping.

In 1881, at Bridlington. "Sudden and extensive outbreak of typhoid." Especially affected houses supplied with milk from a particular dairy. Dairy well water polluted and possibly specifically infected. Some localities badly drained, with fever persisting. Nuisances from cesspools, defective house drains, and foul open water courses.

In 1881, at Hinckley (Leicester and Warwick). Water from wells in danger of pollution and liable to drought. Nuisances from bad drainage, privies, middens, and pig-sties.

In 1881, at Howden Rural Sanitary District (Yorks). "Outbreaks

of typhoid in different villages." Water supplies from shallow wells much exposed to excremental pollution. Streams polluted by privy contents. Specific pollution of school wells followed by outbreaks.

In 1881, at Ilkeston (Derbyshire). "Extensive epidemic." Due chiefly to infected sewer air escaping within and about dwellings. Groups of cases referable to infected privies and polluted water. Storage of excrement in large unwholesome privy pits. Half the town water supplied by wells sunk in a filth-sodden soil, and from tanks in direct communication with sewers. Deficient drainage.

In 1881, at Tawton (North Devon). "Limited epidemic due to specifically contaminated water." Water supply from wells and other sources, both exposed to dangerous pollution. Sewage discharged into water course. General excremental nuisance. Privies filthy and dilapidated. Bad drainage.

In 1881, at Tavistock Rural Sanitary District. "Typhoid endemic with occasional severe epidemic outbreaks." Drinking water often exposed to dangerous pollution. Excremental nuisances frequent. Sewerage and drainage defective.

In 1881, at Uckfield. "Outbreak of enteric fever." Wells sunk in soil befouled by soakage from privies, cesspools, ash-pits, and drains. Sewers unventilated. House drains unventilated and in connection with sewers.

In 1881, at Bangor and Bethesda, 548 infected; 42 deaths. The attacks limited to the consumers of water obtained from the Bangor water-works; case of typhoid at Llwyurhandir; excreta from this patient passed into the drain, thence to a small stream from which Bangor water supply is drawn, and thus to the filtering reservoir. Even if the filters could have arrested infective matter, many of the plugs were defective; fully one third of the water passing unfiltered into the water main. Cesspit privy at Llwyurhandir is below level of infected drain. Spread of disease promoted by connection between houses and ill-ventilated sewers, and filth accumulation near houses.

In 1882, at Galgate (Lancashire). Outbreak among persons drinking water obtained from a well contaminated with excremental matter. Insufficient water supply. Wells of doubtful purity. Midden privies a source of nuisance.

In 1882, at Millbrook (Cornwall). Same causes operating as caused the epidemic in 1880, q. v. "Renewed outbreak."

In 1882, at New Shoreham (Sussex). "Prevalence of enteric fever." Water drawn from polluted wells. House drains in communication with public sewers.

In 1882, at Norwood (Middlesex), 35 infected. Sudden dissemination of typhoid in fourteen dwellings supplied with water from the same well. Infected cesspool contents were deposited in a hole some forty feet from the particular well, upon higher ground, and in the line of natural soakage to the well. Intervening was a porous gravelly soil.

In 1882, at Southborough, 24 houses infected. Outbreak of typhoid in a circumscribed locality. Drains admitted of contents escaping into surrounding soil, and often of gas discharging into houses. Water entirely from local wells, often in close proximity to drains.

In 1882, at Ebbw Vale Urban District. "An almost house-to-house prevalence of typhoid in small detached hamlet in 1881." Due to excremental pollution of atmosphere from privy and other nuisances. Public water supply had failed, and inhabitants had largely resorted to questionable sources. Prevalence of sewage nuisances.

In 1882, Clapham (Surrey). "Outbreak of typhoid fever." Attacked (with one exception) only persons getting milk from a particular dealer at Clapham. Mode of milk infection unascertained, but there had been cases of fever some months before in the place (Axminster), whence it came, and the well water at the two milk farms there concerned was contaminated with sewage products.

In 1882, at Dartford Registration District. "Prevalence of enteric fever." In parts invaded the sub-soil water stands three or four feet only from the surface, and into this water level wells and cesspools are sunken indifferently. In the part of the town attacked, forty per cent of houses were supplied from local wells, and in these houses eighty per cent of the fever attacks occurred. Cesspool and other nuisances very common.

In 1882, at Ulverston (Lancashire). Considerable prevalence of typhoid in the autumn of 1881. Water mains water often so turbid that inhabitants resort to local supplies. Outbreak confined to users of a certain one of these local supplies. Insufficient sewer ventilation.

In 1883, at Hitchin (Herts), about 100 infected; 7 deaths. Public water supply liable to pollution by reflux of water from the river Hiz to the reservoir and pumping well. The river receives refuse water and sewage; and "it is impossible not to admit that, in all probability, there has been direct relation between the circumstances of pollution on the 30th December, 1882, of the public water service, and the outburst of fever in mid-January." Defects of public sewerage and private drainage.

In 1884, at Beverley, 231 infected; 12 deaths. Water supply chiefly from borings into the chalk which are occasionally polluted by direct percolation from a sewage-polluted soil. Water on analysis found highly charged with sewage matter. Sewerage antiquated and bad. Sewers unventilated, and having catch-pits at intervals to retain solids. Cesspools compulsory where water-closets are in use, being made in the course of the house drain before this latter enters the public sewer—the sewer thus receiving only the putrid outflow of the cesspool. Privy middens of large size uncovered, often connected with drains, and sunk below the surface level. Main feature of outbreak was specifically contaminated general water supply of Waterworks Company derived from deep well in chalk. Company's well and reservoir close to sewage-irrigated field belonging to East Riding County Lunatic Asylum, in which cases of typhoid had occurred antecedent to outbreak in Beverley. The outfall of the Asylum drains is into a settling tank in the corner of a seven acre field next to the Water Company's premises. Once a fortnight the settling tank is emptied by an intervening drain into an adjacent cesspit—this being simply an excavation in the clayey soil. It was not proved that soakage could occur from the cesspit to the well. Experiments negatived its possibility. Frequent chemical analyses of the Company's water during the epidemic repeatedly proved its purity and fitness for domestic use. Thus the method of contamination was probably the broad irrigation practiced on the field.

In 1884, at Colne (Lancashire). “Sharp epidemic of typhoid.” Origin undiscovered. Drainage very bad. Sink pipes in untrapped connection with drains. Nuisances from ash-pits, refuse heaps, and cow-sheds. Pollution of river Colne. Water supply fairly pure.

In 1884, at Kidderminster. “Extensive outbreak of typhoid over the whole town.” Public water supply in large part derived from an artesian well in dangerous proximity to sewage-pumping station. Intermittent water service—hence possibility of accidental contamination of water by foul matters sucked into pipes during intermissions. Arrangement of sewers favors the distribution of infected sewer air. House drains badly trapped, unventilated, and often in connection with interior of houses. Bad scavenging. Refuse accumulations; offensive trades. Outbreak owing either to inhalation of spray from sewage-polluted river water, or to drinking water of a well contaminated by soakage from the same.

In 1884, at Romford District. Outbreak of typhoid at Dagenham, due to drinking polluted well water, and to effluvia from foul ditch, in

1883 and 1884. At Ilford in 1882-3, due to infected milk supply and subsequently spread by sewage effluvia from cesspools and defective drains.

In 1884, at St. Albans, January, 2; February, 2; March, 4; April, 0; May, 93; June, 38; total for May and June, 131 infected; 23 deaths during May, June, and July. "Simultaneous outbreak of typhoid fever during June and July at St. Albans and London among the consumers of milk coming from a farm near St. Albans." Absence of evidence that the milk at the farm had become infected in any of the commonly-believed ways. Some reason for believing that this farm milk which had given rise to a serious outbreak of typhoid in St. Pancras in 1883, had retained, though to a slight degree, power of infecting its customers in the interval between the two outbreaks.

In 1884, at York, 315 infected; 54 deaths. Not due to water contamination. Milk supply exculpated. The outbreak was apparently due to exhalations from the sewers after an exceptionally dry, hot summer. Sewers unventilated; their outfalls covered by, and admitting backflow from, the River Ouse. Sink pipes generally disconnected from the drains.

In 1885, at Faldingworth and Barlings (Lincolnshire). Faldingworth: small outbreak of typhoid traceable to pump well water polluted by washings from a fever case imported from Newark. Filthy ditch sewers. Barlings: outbreak of typhoid traceable to pollution of the village water supply by sewage. House drainage defective. Vault closets in dangerous proximity to dwellings. Chief supply of water obtained by imperfect filtering of the sewage-polluted village brook.

In 1885, at Hebden Bridge. Outbreak of typhoid, affecting chiefly cottagers using excremental polluted water from the "Birchcliffe stone cisterns." Bad house drainage. Old open middens in dangerous relation to dwellings and open water courses. Springs used for domestic purposes in almost all cases open to pollution.

In 1885, at Kidderminster, 35 in second half of 1885. Cases existing in places where defective house drains existed — *vide* 1884.

In 1885, at Lower Sheringham (Norfolk). Severe outbreak of typhoid under circumstances pointing to contamination of milk supply. Origin of infection uncertain. Water supply from land drainage and rivulet in danger of pollution. Drainage defective. Nuisances from privy pits, net tanning, whelk boiling, and from ponded sewage, ordure, and fish offal.

In 1885, at Market Weighton (Yorks). "Prevalence of enteric

fever." Due to drinking water from surface wells in a porous soil, contaminated by soakage from defective sewers, cesspools, etc. Accumulation of excrement.

In 1885, at Newark. "Typhoid prevalent in 1884." An old and closely built town. Sewers mostly unventilated. Sewage discharged unpurified into the Trent. Company's water supply derived from gravel bed in the neighborhood of this river. Shallow wells also in use liable to contamination. House drains with loose iron traps, permitting escape of drain air into and near houses. Offensive midden privies. Refuse accumulations.

In 1886, at Swanage (Dorset). "Outbreak of enteric fever." First case in January; assumed an epidemic form from July to September. Water supply largely from impure wells. Drainage system consists almost entirely of square rubble sewers, many of them joining a highly polluted and almost stagnant brook. Large uncemented privy pits on and in permeable sedimentary rocks dipping steeply toward the town. No public scavenging beyond street sweeping. The epidemic associated at its commencement with the use of milk from a dairy situated on the polluted brook and without water supply on the premises.

In 1887, at Eastry Rural Sanitary District (Kent). "Mortality from typhoid sixteen per cent higher than elsewhere in England or Wales." Water supplies of most of the villages subject to pollution. Cesspits and privy pits in close proximity to dwellings and wells, polluting both air and water. No proper means of sewerage. Refuse and excrement accumulations.

In 1887, at Margate. "Increasing mortality from enteric fever." Deposit of sewage and excrement in deep cesspools and cesspits sunk into the chalk. Pollution of air and soil by excremental accumulations. Water supply pumped from a well in the chalk, beside a populous neighborhood. Water of bad quality and exposed to contamination by soakage of sea water and from cesspools. Water-closets getting water directly from mains.

In 1887, at Mountain Ash (Glamorganshire), 518 infected. "A sudden and severe epidemic of typhoid, 518 cases occurring between July and October, 1887." The specific poison was distributed by water delivered through one particular water main. Of the 396 houses supplied from this main below a certain point of its course 57 per cent were invaded by fever. Near this point (where evidence of specific contamination commenced) defects in the main were discovered, which would lead during intermissions of water supply to insuction of

air, and probably of liquid, from old drains. Earlier history shows that since the water main in question was laid in 1855, an endemic prevalence of typhoid has existed in the district supplied by it. Analysis of the water showed that a sample taken before the nightly intermission of service was pure; that taken from the same tap after intermission gave evidence of animal contamination and of the appearance of low forms of life. Sanitary conditions in other respects fair.

In 1888, at Buckingham. A sudden outbreak of typhoid in January and February, confined at first to a poor suburb of the town, and especially affecting persons drinking water from a particular "spout," the water conduit to this spout exposed to pollution from a leaky drain which had received specifically infected excreta from a previous case of typhoid. Scattered cases later on referable probably to infection derived from defective drains and foul closets. Water generally from wells exposed to risk of pollution by leakage from cesspools, drains, etc. Sewers and house drains very defective, allowing deposit, leakage, and entrance of drain air to houses. Old privies with large deep vaults; foul hopper closets.

In 1888, at Flint. Fourteen cases of typhoid fever in seven houses, between August 11th and 20th; subsequently general over the town. Water supply intermittent and discolored when turned on in the morning. Method of excrement disposal in infected locality such as to cause faecal fouling of air and soil.

In 1888, at Keynsham Rural Sanitary District (Somerset and Gloucester). "Recurring prevalence of epidemic typhoid." Conveyed in the bodies of persons attacked from one part of district to another. Spread of the disease by specific excremental pollution of water. No proper sewerage provision. Cesspit privies in vogue. Water supplies exposed to dangerous pollution.

In 1887 and 1888, at Mytholmroyd (Yorks), 66 infected in 1887; 10 deaths. In 1888, 29 infected; 5 deaths. Prevalence of unwholesome condition of water supply, drainage, and excrement disposal. River Calder highly polluted with sewage and excremental matters, in fact little better than an open sewer. Twenty-two of the fifty-five houses attacked are situated in the immediate vicinity of this river, inhaling the effluvia arising therefrom. The local sources of water supply are from small streams descending the hillside. Washings from meadows and manured lands, and excremental filth pollute these streams. The water is conveyed in pipes from a spring on the hillside. This spring water is reinforced by sewage from a manure heap.

No system of sewage exists. Bad scavenging. Midden privies flowing over, etc.

In 1887-8, at New Brighton (Cheshire), 21 infected during 1887-8. "Typhoid fever prevalent." The fever prevalence had no relation to the water supply, nor to the milk supply. Faulty sewer ventilation. Drains are commonly carried beneath the floors of dwellings, without any special precautions. Gullies having unbroken communication with the drain, and so with the sewer, often exist in cellars. "The appearance of typhoid, at New Brighton has been found so constantly associated with specially grave defects of drainage, as to create a strong suspicion that this condition has been the cause of the mischief."

In 1887-8, at New Clee and Gt. Grimsby, 260 infected; 52 deaths. General water supply good. Some of the households drew their water supply from local wells, which were subject to risk of specific contamination. Some cases were due to the use of a box privy, into which the infected discharges of an earlier case had been thrown. More frequently, however, such discharges were thrown into the yard drain-inlets and catch-pits, and so infection of some of the smaller and defective drains occurred. Unventilated public sewers, along with faults of private drainage, led to ventilation of sewer air into private dwellings. "The pollution of wells by excremental matters must be considered to have played a part in the epidemic."

In 1888, at Stourbridge Rural Sanitary District (Staffordshire). "A severe outbreak of enteric fever in third quarter of 1888 in Pensnett and Bromley." Affected specially young adult males employed at ironworks, their chief beverage being ginger beer, made often at home from the water of polluted wells not wholly boiled. No sewerage; slop water nuisances prevalent; privies with wet open ash-pits; pig-keeping nuisances; wells exposed to pollution from these sources.

In 1888, at Standish-with-Langtree (Lancashire). "Prevalence of enteric fever." Ventilation of sewers obstructed. Midden privies drained into sewers causing nuisance. Water supply from local sources, one of them exposed to excremental pollution; incidence of fever chiefly in families using this supply, but spread of disease due also to privy defects. No system of scavenging. Prevalence of nuisances from undrained yards and from pig-keeping.

DIPHTHERIA.

The mortality returns made to the registrar of vital statistics as well as the monthly returns made to this Board, show that diphtheria is a disease that every year destroys the lives of many children in New Hampshire. The fearful results of this horrible malady, in the magnitude that it prevails, are, in the light of modern sanitary science, uncalled for, and indicate mismanagement of the disease with respect to isolation and disinfection. It is a pretty well settled fact that diphtheria is a germ disease; that the germ is easily transported, and propagated, under suitable conditions; that unless the conditions are favorable the germ loses its vitality and becomes harmless. It is therefore an infectious and contagious disease. Evidences of direct infection from an existing case are common. Because persons exposed to the disease do not always contract it, is no proof to the contrary. We have seen the disease spread from person to person and from family to family with fearful and terrible consequences, simply because reasonable and proper measures were not taken to prevent it. That it can be restricted and prevented has been often demonstrated whenever sanitary and restrictive measures have been thoroughly attended to and enforced.

Nothing favors the ravages of this disease so much as filth, in some form or other; and with neglected sink-drains, foul privies, undrained cellars, wet sites, unventilated rooms without sunlight, polluted drinking water, and many other unsanitary surroundings, a liability to an outbreak is greatly increased, and treatment of the disease under such circumstances is often of little avail in saving life. Therefore, first of all, every family should see that the premises are clean and free from such conditions as invite its appearance to the household.

There is some doubt that bad sanitary conditions develop this disease *de novo*, but there is no doubt that filth is a condition *par excellence* for the culture and propagation of the infection. Unsanitary environments also weaken the powers of resistance against this and other diseases.

There are various ways in which the disease is spread. There are on record fourteen epidemics of this disease caused by milk. In only one of the epidemics was the disease found in human beings at the dairy prior to its outbreak among the customers and the dairy hands simultaneously. In five instances exceedingly bad sanitary conditions were found at the farm and in close relation with the milk. It was believed that the specific germ got into the milk and there developed in such abundance as to infect the consumers. Instances are on record where the disease has been transmitted by cats and other domestic animals, they sometimes becoming infected with diphtheria or act as a carrier of the disease. The Connecticut Board of Health Report, for 1889, cites a case conveyed by clothing, and a second case from a nurse probably through clothing; by one child chewing gum which a convalescent child had been chewing; by a case mistaken for mumps; by contact with children convalescent two or three weeks after recovery; by inhabiting tenements where the disease had been, without proper disinfection; books used by children during convalescence are supposed to be the purveyors of the disease to other families.

The direct transmission of the disease from the infected to the well is of common occurrence, and cannot be doubted by any one who has had much experience with this disease.

Public funerals of persons dead of this disease have sometimes been the cause of an outbreak of diphtheria. Indeed such results have been frequently reported. Dr. Henry B. Baker, secretary of the state board of health, of Michigan, in a recent report says:

“In March, 1890, two corpses, woman and child of same family, dead of throat disease, were conveyed from Montgomery county to Lapeer county, Michigan, where just one week from the day the coffins were opened and the remains were viewed, a person who was thus exposed came down with diphtheria. Many others would probably have been exposed except for the action of the local health officer, Dr. C. A. Wisner, who, suspecting that the cause of the death was

diphtheria, warned the neighbors and forbade the opening of the coffins at the funeral. He promptly isolated the first case that occurred, and no epidemic resulted. This is quite different from the result of a similar occurrence in Zanesville, Ohio, last spring, where many deaths resulted from exposure to a corpse brought from Chicago."

At the last meeting of the American Public Health Association the committee on the "Cause and Prevention of Diphtheria," made a report based upon the most recent scientific investigation and special reports from various parts of America upon several hundred cases of the disease. Referring in a general way to the disease the committee says:

"For some cause, the public, including medical practitioners, has grown apathetic and hopeless in regard to the prevention of diphtheria to a degree not experienced toward any other disease. There is a submission to a yearly sickness, from this cause, of not less than forty thousand cases in the United States and Canada, with an annual death loss of at least ten thousand lives; and this, with little demonstration of organized resistance. This condition probably has come from the observed limitations of curative agencies, and from the want of satisfactory demonstration that preventive measures can be adopted and made effective. Then, too, with the wide distribution of cases, and constant presence of the disease in almost all of our large communities, together with the knowledge that where one case is detected, dozens escape detection, has this feeling of hopelessness become established.

"Can any one doubt that a similar number of cases and deaths from cholera, yellow-fever, or other of the rapidly spreading epidemic diseases, would arouse us to utmost effort to limit and stamp out the destroyer? Yet it is from those diseases, which prevail so constantly that we are not surprised by them, that our greatest losses occur, and the lives thus lost are made to appear as being regarded of less value than those lost by sweeping epidemics, for whose suppression or prevention money and effort are expended without stint. No doubt this state of the public mind in respect to diphtheria could be

dispelled, and replaced by one of energetic resistance and hope, could this Association, or any other body of competent investigators and leaders, be able to demonstrate specified causes or sources of this disease, which could be resisted and overcome by disinfection, inoculation, isolation, or by any other method compatible with the well-being of those unaffected. Unless this can be done and confidence infused into preventive measures, this disease remains a constant reproach to sanitary science, and the public falls further into submissive inaction."

Isolation and disinfection are the recognized means by which diphtheria may be suppressed. All sanitary authorities agree to this, but the obstacles that stand in the way of effectually putting these forces into operation are great, and will remain so until the public mind becomes better informed upon these points. Alluding to these questions the committee in the report mentioned say that—

"Scientific isolation of recognized cases of diphtheria is rarely, if ever, secured in private homes. Disinfection of bedding, clothing, and all articles coming in direct contact with the sick, or closely associated with them, require special methods and apparatus to be made reliable. Therefore, whether hospitals for compulsory treatment can wisely be instituted or not, disinfection stations can and should be erected and operated at the public expense. The value and duration of isolation can be determined only when made scientifically complete. The same is true of disinfection."

Dr. Arthur Hazlewood in discussing this subject before a sanitary convention in Michigan says:

"What shall we do to be saved from diphtheria? I answer in three words, prevent, isolate, disinfect. Under the first head—I have great faith in the resisting power of a healthy constitution. Our bodies have the power to destroy, to some extent, the disease germs coming in contact with them, but to do this effectually a vigorous state of health is needed; also, freedom from cuts, sores, or other breaks in the skin or mucous membrane. This condition of health we maintain by

proper care of our persons and surroundings; by temperance in all things—eating, drinking, smoking, dancing, or other forms of dissipation; by taking sufficient sleep; by daily bathing in tepid water; by out-door exercise suited to the strength of the individual; in short, to render our bodies able to resist disease, just as a military fortress well built, guarded, and manned, is able to resist attacks of outside foes.

“But when the disease attacks us and finds a lodgment, are we to allow it to have its own way and strike down one after another of our dearest and nearest according as it listeth? A thousand times no! Forewarned is forearmed. We do know how to prevent its spread, we do know how to destroy its action, at least beyond the first victim, but, unless we do our best, we can blame no one but ourselves for the mishaps.”

But we continue from the excellent report of the committee of the American Public Health Association quoting extensively from its general discussion of the disease and giving its detailed suggestions *in toto*:

“It is the generally accepted belief that diphtheria is dependent upon a specific germ. Less than one half believe this specific cause is developed in other than albuminoid substances, and almost an equal number consider the question of its development still unsettled. Over one half believe that the specific cause is preserved in other than albuminoid substances.

“Air, water, and food are the media by which the virus gains entrance to the organism, and the air passages, mouth, and throat are the channels; occasional cases arise from inoculation through carelessness or uncleanness.

“A great variety of conditions increase individual susceptibility. They prevail in frequency in the order named,—nasal and pharyngeal catarrh, debility from any cause, age, etc.

“Many consider the disease much more fatal in scrofulous children with light hair and eyes, than in those having dark skin, hair, and eyes.

“The general opinion prevails that the disease is never caused by any agent developed within the body, but is always from without. All but a very small per cent consider that those affected with diphtheria should be carefully isolated, at least until all traces of the disease have disappeared, while many would isolate from one to eight weeks after recovery.

“Sulphur, mercuric bichloride, heat, carbolic acid, and pure air, in the order named, are the substances considered most reliable for disinfection. Sulphur in the form of sulphurous acid made by burning sulphur in the presence of moisture, mercuric bichloride and carbolic acid in solution, free ventilation, heat in form of steam, boiling water, and dry heat are the methods by which these substances should be used.

“Only a small per cent consider disinfectants sufficiently reliable to make it safe to do away with isolation entirely, although many think the time of isolation may be safely shortened where thorough disinfection is used.

“A very large per cent believe public health demands the maintenance of hospitals for isolation and treatment of those affected with diphtheria. More especially are such hospitals needed in the crowded portions of cities, and among the poor where proper care cannot be afforded. Such hospitals would also be of great service where the disease has become epidemic, and would enable the sanitary officers to stamp out the disease.

“There are no climatic limitations known as affecting either the development or the spread of diphtheria. It has been found to be most prevalent in the cold, damp months of the late fall and early spring, but catarrhal affections also prevail more at that season, and diphtheria may find easier access to the human system because of the already diseased membranes.

“Domestic animals and fowls are believed by the majority of observers to be liable to the disease. Many of those answering the question have themselves observed cases of diphtheria in dogs, cats, and the common barnyard fowls, and have

traced cases in human beings to these animals. They may also be the media by which germs of the disease are carried from person to person, or from house to house, the fur of the dog and cat being an excellent vehicle for conveying the virus. The investigations of Bretonneau, Trousseau, Virchow, Oertel, Mackenzie, Klebs, Wood, Formad, Sternberg, Loeffler, Prudden, Northrup, Koch, and many others of recent times, in and by strictly scientific methods, have led up to and perhaps have demonstrated a specific cause for diphtheria, and their conclusions, spread through the writings of the last thirty or forty years, cannot fail to have made an impression on all students. Yet the fact remains, that so much difficulty has been experienced in reconciling the facts observed in this field of disease with the conclusions of these students in laboratories and hospitals as to beget a very conservative and even doubting state of mind among thoughtful observers, on many of the points presented. As a practical question in preventive medicine, the determination of cause or causes is imperative,—the basis of all action. The more early, precise, and exhaustive such determination can be made, the more direct and hopeful the application of preventive measures.

“It cannot truthfully be said that no advance has been made, in this matter, in late years. On the contrary, in the whole field of research in respect to the micro-organisms found actively associated with various diseases, most pains-taking and exhaustive processes have been applied to the discovery, classification, and life history of each and every species, with great additions to our knowledge of the subject. Perhaps the most important point developed in this field, in most recent times, has been the significance attaching to the *products* of these organisms, during their process of development and activity, under favorable conditions. Such products appear to bear a very causal relation to the phenomena of many diseases, and also have been observed to limit the action and life of the producing organism, when sufficiently concentrated. On another side of this subject, it has been made safe to say that

not only has every living organism a certain natural and, in a measure, selective habitat, nutriment, method of reproduction, and tolerance of variation from its norm, but also has its own special defences against other organisms. And while an attack may be overwhelming mechanically, or, by reason of numbers simply, overcome such normal resistance, there can be no other logical conclusion than that the general or special resistance of one organism toward another can be increased or diminished. A part of such resistance, by the human organism, has been observed to be a process of reception and destruction of certain micro-organisms, by cell and gland action, resembling a form of digestion. To secure and retain such resisting cell and gland functions, together with integrity of tissues, the human organism must be in no defective state. The impairment of disease resistance may and does come from so many varying causes and channels, and is so difficult of recognition and estimation of its significance, as to be still restricted to general terms in description, and only of general application in preventive efforts. And although admitted to be 'general,' as indicated, no process of reasoning can or should lessen the force of the universal law, that well organized, developed, and nourished living structures resist the entrance of all external agents calculated to injure or destroy them better and longer than those of inferior organization, imperfectly developed and poorly nourished.

“On the question of specificity in diphtheria, the recent work of Roux and Yersin in France and Loeffler in Germany gives, perhaps, the index and conclusion to bacteriological work in this field up to the present day.

“For the purpose of giving such work its proper recognition and value, and at the same time giving opportunity to compare their conclusions with the result of observations of the course and spread of the disease in this country, extracts are here cited. In the ‘Annals of the Pasteur Institute’ MM. Roux and Yersin state it as their opinion that the Klebs-Loeffler bacillus is so specifically identified as a cause of

diphtheria as to render it necessary that all practicing physicians should be able to isolate and identify this bacillus.

“They themselves have made or verified the diagnoses of diphtheria by this method in more than a hundred cases, and they think that not until diagnoses are made in this way will thoroughly scientific results be obtained. In order to stain the bacillus so that it can readily be seen and studied under the microscope, it is merely necessary to move a small fragment of the false membrane, by means of a piece of absorbent cotton-wool tied firmly to a pair of forceps, or any other safe carrier, from which it is transferred to a scrap of blotting-paper, and thence to a cover glass, where it is broken down as finely as possible, heated over a flame, and stained methyl blue or gentian violet, washing thoroughly with water before examining.

“They say that the diphtheria bacillus appears to ‘stain’ more rapidly and deeply than any of the indifferent organisms associated, and among which they can be seen grouped in small masses as short, straight or curved rods with slightly thinned or rounded ends. In some instances they appear slightly clubbed or pear shaped; and they may be granular and unequally stained. They assert that, in true diphtheria, these bacilli are never absent, and with a little practice it is easy to distinguish them from all other forms. This examination may be completed in a few minutes, and gives, when confirmed by culture experiments, the most precise information. Even the course and prognosis of the disease may be followed and indicated by the daily use of the microscope upon the exudate and secretions. Where improvement is taking place the specific bacilli become less numerous, while other associated microbes become increased in number. These writers assert that some of the associated microbes appear to interfere with the growth and activity of the specific bacillus. These bacilli retain their vitality, when dried, for a considerable time, and withstand a temperature of 98 degrees C. (208 degrees F.) for a whole hour. As a very obvious point in practical application Roux and Yersin,

together with Loeffler and many others, state that 'the best method of arresting the spread of diphtheria is to recognize the disease as early as possible. This can be done by microscopic examination, confirmed by cultivations on blood serum, both of which can be made available in twenty-four hours in private practice and by ordinary practitioners of medicine. Active diphtheritic virus can remain in the mouth of the affected for a long time after the malady is apparently cured. Consequently diphtheritic patients should be allowed to resume their ordinary course of life only when they are no longer bearers of the bacillus. The virus retains its vitality a long time when kept in a dried state and when not freely exposed to air, and it is therefore necessary to disinfect, in a steam sterilizing apparatus, the linen and all articles that have been in contact with diphtheritic patients. The attenuated virus of diphtheria is widely distributed, and readily regains its virulence under favorable conditions. It is therefore necessary that at the commencement of simple forms of sore throat, antiseptics should be applied carefully and thoroughly.' Klein and some others maintain that domestic animals, including cats, dogs, cows, and some fowls, are affected with the true diphtheritic virus, while Loeffler and others regard the disease to which such animals and fowls are subject as a separate and distinct disease. Experiments appear to demonstrate, however, that certain animals, such as guinea pigs, rabbits, young dogs, etc., are easily susceptible to the true diphtheritic bacillus.

"In conclusion, and for the purpose of exerting some influence upon public opinion respecting the cause and prevention of diphtheria, your committee would respectfully offer the following propositions to the Association, which they hope may be adopted:

"*First.* We recognize the disease known as diphtheria to be due to a specific cause, owing to which all cases become dangerous as sources of contagion and infection.

"*Second.* For the prevention of diphtheria, isolation of those affected and infected should be made scientifically com-

plete in all cases; and we believe that by such isolation of all recognized cases the spread can be immediately checked.

“*Third.* That while it may not be possible to secure prompt recognition and isolation of all cases of diphtheria in the present state of knowledge and opinion, we believe it the duty of local boards of health and health officials to provide stations, apparatus, and agents for the reliable disinfection of all bedding, clothing, and articles which may be the holders and carriers of diphtheritic virus, such disinfection to be done at the public expense and under official control.

“DETAILED SUGGESTIONS FOR THE APPLICATION OF
EFFICIENT MEANS FOR CLEANSING AND DISIN-
FECTING CLOTHING, FURNITURE, AND PREMISES
WHICH HAVE BEEN EXPOSED TO THE INFECTION
OF DIPHTHERIA.

“DISINFECTION OF CLOTHING BY HEAT.

“All infected articles of clothing before handling or moving should be moistened with a watery solution of carbolic acid, or even water alone, to prevent germs of the disease passing into the air and thus becoming disseminated, and also to protect those engaged in the work of disinfection.

“All small and inexpensive articles and cloths, which can be spared without serious inconvenience should be destroyed at once by burning. Other articles of clothing, bedding, carpets, rugs, and all textile fabrics should be placed in sufficient water to cover them and *boiled* fully one hour.

“Mattresses and ‘ticks’ should be ripped open, the covers boiled and the contents replaced if unsoiled. If the contents have been soiled, they should be destroyed. Carpets should be ripped into separate breadths and boiled. After boiling as indicated, all such goods should be hung in the open air and sunlight for two or more days. ‘Ironing’ all such goods while moist, with an ‘iron’ kept as hot as the goods will bear without scorching, develops steam under some pressure, and will disinfect in a measure, but will not

take the place of prolonged boiling. 'Steam' under a pressure of twenty-five pounds to the square inch will take the place of boiling, where it can be applied.

" 'Dry heat,' applied in chambers for the purpose, and in which the goods are heated in all portions to a temperature of 230 degrees F. for one hour, will serve the purpose where boiling and steam under pressure cannot be used.

"DISINFECTION OF CLOTHING BY CHEMICAL AGENTS.

"No. 1. A solution of carbolic acid prepared by placing three teaspoonfuls of the acid to each quart of water used (and thoroughly shaken); or

"No. 2. A solution of 'corrosive sublimate' prepared by dissolving two drams of the crystals in each gallon of water used; or

"No. 3. A solution of chloride of zinc prepared by dissolving two ounces of the crystals to each gallon of water used; —

"Into either of which solutions the goods and fabrics should be placed, and kept under water for twenty-four hours.

"*Sulphur gas*, produced by burning two pounds of sulphur for every one thousand cubic feet of space, with sufficient steam escaping in the room to moisten the air and surfaces, is a powerful disinfectant; but such gas in a tight chamber, in the presence of sufficient moisture to be effective, will injure and destroy clothing.

"Any of the chemical agents require caution in their use, as, taken internally, they become dangerous to life.

"DISINFECTION OF FURNITURE.

"This includes the bedsteads, chairs, vessels, and dishes, and all upholstered and movable articles. These should be washed in the solution No. 1 (carbolic acid) prescribed for clothing, with thorough sponging of the upholstered portions.

"After washing and sponging, the bedsteads, chairs, and all articles chiefly of wood should be allowed to stand, without wiping or rinsing, in the open air for twenty-four hours or more. All earthen, tin, or iron vessels, dishes, or utensils

should be first washed in the solution, and then placed in an oven or other chamber and heated to as high a degree as they will bear without injury. After this treatment, all such furniture should be thoroughly rinsed, and the rinsing water carefully saved and boiled for one hour before being thrown upon the ground or into sewers or drains.

“DISINFECTION OF PREMISES.

“The room or rooms should be tightly closed, after clothing and furniture (as indicated before) have been removed, and all metallic surfaces, such as gas fixtures, mouldings, etc., coated with an ointment made of carbolic acid one part, vaseline fifteen parts. Then sulphur should be burned in the rooms at the rate of two pounds to one thousand cubic feet of air space, with steam enough thoroughly to moisten the air and surfaces. Steam sufficient can be developed by placing three or four hot bricks in a tub of water. The sulphur gas should be kept in the room for twenty-four hours. After thus fumigating the rooms, the floors, baseboards, doors and casings, and every portion of woodwork should be washed with solution No. 2, prescribed for clothing. The walls and ceiling, if papered, should be carefully scraped, and the fragments immediately burned. Then the walls should be thoroughly coated with a quicklime wash, and the outer air and sunlight be permitted to enter freely for one or more days. In cases where expensive papers are on infected rooms, a coating of light varnish may replace the work of removing the paper.

“Diligent search should be made for any inlet into the building which may convey or permit the entrance of air from any sewer, drain, closed cellar or basement, or damp, dark place of any kind under the building or connected to it in any way. If any such inlet is found, or any such place where air is confined, such inlet should be properly closed, and any damp, dark place underneath the building opened up to air and sunlight; and in addition, all such drains and places should be disinfected by a solution of the chloride of lime, two ounces to

the gallon of water. Sulphur may be burned in such places as prescribed for rooms.

“Outside the building all pools of either rain, soil, or slop water near the building should be abated by draining and filling. An excessive soil saturation and retention of water should be relieved by draining. Any accumulation of garbage, decomposing animal or vegetable substances, muck, or dust, should be carted away and burned.

“Also the contents of cesspools, vaults, pits, and ash heaps, where refuse matters have been thrown, should be carted away, and all such places made sweet and clean. These places can be disinfected by the use of chloride of lime in solution as prescribed, or, in moist places, by sprinkling the lime over the surfaces. All dark, damp pits, vaults, drains, rooms, spaces under the building or near it, should be freely opened to the outer air, thoroughly cleaned, and kept so.

“The care and treatment of persons sick with diphtheria, both at the time of their sickness and for some time after all signs of the disease have disappeared, are of the utmost importance to promote recovery and diminish the work of disinfection.

“A constant use of substances known to be destructive to the bacillus and virus of diphtheria during the course of the disease, by washes, gargles, and spray with steam upon the diseased surfaces, prevents the escape of the virus to surrounding objects. The complete isolation of the affected, the removal of all unnecessary articles of clothing and furniture from the sick room, the prompt attention to and destruction of all secretions and excretions expelled, the free admission of sunlight and pure air to the sick room will diminish the extent and labor of disinfection.

“The duration of isolation of persons affected with diphtheria should extend so long as any of the bacilli are present in the secretions; and as this fact cannot be determined without repeated, skilful, microscopic examinations, the affected individuals should be kept strictly isolated for not less than four weeks after the disappearance of all traces of membrane.”

In addition to the suggestions embodied in the foregoing report we desire to emphasize in the strongest possible way the importance of *thorough isolation and disinfection*. Without it there is no certainty of controlling the disease. We believe that if every case of diphtheria could be as effectually taken care of as is customary in cases of small-pox, the ravages of the disease would be exceedingly limited. Much of the so called isolation is only a pretense and disinfection as very commonly practised is a useless farce. Either to be effectual must be *complete*.

Dr. Hazlewood, before quoted, in further treating this subject truly says:

“How are these magic wands—*isolation and disinfection* to be obtained and applied? By having an effective health officer paid a salary by the citizens just as you pay a chief of police or fire department, whose duty it shall be to ascertain removable causes of disease, and whose authority in such matters shall be recognized equal to any officer of your corporation.

“The efficiency of the health officer should be determined, not by the number of outbreaks speedily and effectively ended, but by the absence of disease or as some would say, by the office being a sinecure. In towns and villages such officers are not needed to expend their whole time in the duties mentioned, and in some instances perhaps are not appointed—whenever fire is called, all take part in one way or another in overcoming it. But with this disease as well as other contagious diseases, the trouble may be wide-spread before discovery. The annual cost of an efficient fire department in a city of moderate size is about as many dollars as there are units in population, and the police department equally as much; yet, where will you find a like sum appropriated for health purposes? Are the lives of people of less money value than the destructible property belonging to them?”

Every town in the State should have an able, active, and efficient health officer ever ready to perform thoroughly, promptly, and impartially the duties and obligations of the

office. His position should be recognized by the people as second to none in its capacity to protect and benefit the public.

In every case of diphtheria he should enforce isolation, and disinfection should be carried out under his personal supervision, or by some competent person authorized by him. He should qualify himself, if not already competent, to instruct the public upon all the points so essential to the suppression of this as well as other preventable diseases. We repeat that isolation and disinfection are the only agencies that can control this disease with certainty.

HYDROPHOBIA.

Several cases of hydrophobia in the dog have been reported during the year. The action of the last Legislature in establishing a license upon dogs, provided also that the Secretary of the State Board of Health should furnish a description of the symptoms of this disease to be printed upon the blank form of license. In conformity to this law the secretary furnished the following, upon the authority of "Williams' Principles and Practice of Veterinary Medicine," which was printed upon the license blank furnished by the Secretary of the Board of Agriculture :

SYMPTOMS OF HYDROPHOBIA IN THE DOG.

There are no premonitory symptoms — such as pain in the seat of the bite, melancholy and irritability, febrile disturbance, and stiffness about the head and neck. The dog, when the period of latency is passed, becomes restless, dull, watchful, withdraws from its companions, choosing solitude, shunning the light; hiding in corners, or below chairs or other furniture; being fidgety, lying down, then jumping up again in an excited, unnatural manner; it has a tendency to rove about, and if possible to escape from its room or kennel, and wander about the country. At first the dog's power of recognizing people about it does not seem lost; indeed there are moments when the usual faculties of the dog, its affection and liveliness, seem greater than usual. There is a desire to lick anything cold, to rest the nose on a cold object, and to pick up stones, bits of wood, straw, etc. At

this stage the tendency to bite is not observed, but as the disease advances the movements of the animal become unsteady; the eyes follow objects in a peculiarly staring manner; sometimes the dog will stare at some imaginary object, then rush forward, and bite at anything that may chance to be in his way, or even at the air, as if he were catching flies; cushions, straw, and other objects by which dogs are ordinarily surrounded, are tossed about; the animal scratches the ground, snuffles as if on the scent; the appetite is lost, but the thirst is considerable, and the *act of drinking* is performed *without much difficulty* during the early stages of the disease. At a later stage, however, swallowing is performed with difficulty, or is not performed at all, owing to the spasmodic constriction of the throat; but even then the animal has no dread of water, does not shrink at the sight of fluids, but, on the contrary, will plunge its muzzle deeply into it, and endeavor to drink with great avidity. The coat is staring, the skin tight on the ribs, and the belly tucked up. The dog occasionally vomits, the ejected matter being tinged with blood; there is a brownish coating on the tongue; the nose and mouth are foul and offensive, and there is generally a flow of saliva from the mouth.

The mad dog, or a rabid animal of any kind, brought into the presence of one of the canine species, exhibits great excitement, exasperation, and fury, with a desire to attack and destroy what seems the object of its hatred. The females of the canine species do not always lose their maternal affection; on the contrary the young are attended to with great affection. In the course of a day or two after the first manifestations of the above symptoms, the characteristic signs become more marked; the desire to bite is greatly exaggerated; the pupil dilated; the conjunctivae is red and injected; the eyes are alternately wide open with fury, and then closed in a dull but fierce manner. The forehead becomes wrinkled, and the looks of the animal are terrifying and repulsive; the presence of a living object excites the rage of the sufferer, causing it to spring at and endeavor to bite it. Any shining object will bring on a paroxysm of rage or excitement, and water, if the light shines upon it, will do the same; but if placed in a dark place, or where light does not shine, the dog will endeavor to drink with avidity. Intermitting with the excitement are periods of great prostration, the exhausted animal lying down in the quietest spot it can find, insensible to all surrounding objects. All at once, however, it springs up, and becomes greatly agitated; the excitement, rage, and agitation being always much greater when

the animal is surrounded by noises and objects; when away from these things, in a quiet place, the fits of rage are not so great, sometimes scarcely observable.

The bark of the rabid animal is unnatural; it is husky, spasmodic, and more of the nature of a howl. In some cases, the nervous symptoms are those characterizing paralysis of the jaw, with inability to close the mouth; the lower jaw is dropped, the cavity of the mouth and its contents exposed, the tongue dry, and the buccal membrane of a brownish hue. This is the "*dumb madness*," thus called because the animal is unable to bark or howl. Rabid dogs have a tendency to eat filth; they have been known to eat portions of dead dogs, and to swallow hair, coals, earth, excreta of all kinds, and these remaining in the stomach present a characteristic *post mortem* appearance. A mad dog, when loose, will travel an immense distance in a short time, generally rushing at everything that comes in its way, but preferring to attack other creatures than man, and finally endeavoring to return home, as if prompted by some instinct. The pulse is said not to be accelerated, nor are the respiratory movements much increased, except during the paroxysms; the bowels are constipated, and the urine is high-colored; the gait is unsteady, the tail droops, the head is depressed, the nose protruded; the fits of rage become shorter, those of depression longer; sight, scent, and hearing are much impaired; insensibility to pain, which is generally present from the earliest stages, is more and more manifest; and finally paralysis, particularly of the hind limbs, supervenes, and if not destroyed, the dog dies, an emaciated, repulsive object, the desire to bite remaining to the last. In the dumb form the ability to bite is lost, as well as the power to lap fluids. The exposed and protruded tongue is covered with a stringy, tenacious saliva; the desire to drink is even more intense than in the furious form, and attempts to lap and swallow become painful to witness. Squinting of one or both eyes has been observed; there are also abdominal pains in some instances, and an inflamed condition of the nasal cavities, larynx, and bronchial tubes. There is no tendency to harm and bite surrounding objects, and the dog dies from coma, exhaustion, and suffocation. Both forms of the disease terminate in death in from four to eight days. It is, however, reported that some chronic cases of rabies exist for an indefinite period.

The dread of water—hydrophobia—which has been looked upon by some as the diagnostic symptom of the disease, is absent in the dog. The desire for water is always excessive; there is inability to

swallow fluids, hence a dog will plunge his nose deeply into water, lap it with avidity, but owing to the thirst being still unallayed, he will become greatly agitated, and is thus often thrown into a state of fury or of involuntary spasms.

SOME OBSERVATIONS UPON THE CAUSES OF DEATH IN NEW HAMPSHIRE.

An accurate record of the causes of death constitutes the only guide or measure by which the results of sanitary work can be definitely determined; it also as effectually points out those localities to which the attention of the health officer should be turned for active work to lessen an abnormally large death-rate. Were it possible to secure the return of every case of illness that appears in the State we would have an absolutely correct criterion upon which to base all calculations respecting sanitary work. Such a record, however, under the present conditions of social, moral, and legal government is not attainable, therefore, the next best information, which thanks to the progressive spirit of the people of the State we are in the possession of, is a reliable and approximately correct record of deaths. We would be more fortunate if this record covered a longer period. It is only within the past seven years that the death returns have been sufficiently accurate for making deductions respecting the prevalence of certain diseases, yet the facts that have been established from the mortality records of this brief period are invaluable from a public health standpoint, not to mention the importance of the individual records in matters pertaining to person and property.

In the following pages will be found a brief summary of the causes of death, with comments necessary to a better understanding of the tables presented. Those desiring to study this subject more in detail should consult the registration reports. In these reports will be found the mortality record of every town in the State.

The total number of deaths returned to the registrar of vital statistics for the year ending Dec. 31, 1890, was 7,368. This is the largest number of deaths ever returned in a single year, being 672 more than was returned in 1889, and 766 more than the average for the past seven years. The largest number heretofore reported, was 6,854 in 1888.

Before going further it may be well to anticipate briefly some of the facts that will be revealed further on concerning the large increase in the mortality returns of the year 1890. The increase of 672 over the returns of the previous year can be accounted for only to a very slight extent by greater accuracy in the registration of deaths; but must be due to other causes—in fact, chiefly to one cause, the epidemic of influenza. An examination of the returns shows that the increased mortality is confined almost entirely to three classes, constitutional, local, and developmental diseases, there being a decrease in the deaths from zymotic diseases. As an index to the prevalence of influenza it may be noted that 94 deaths were attributed to this cause alone, as against four for the previous year. In addition to this, influenza, or "*la grippe*," is mentioned as a complication in very many other cases, more noticeably in the diseases of the respiratory system. The mortality from pneumonia was 121 greater than in 1889, acute bronchitis was nearly double that of the previous year, and in a like manner its influence is apparent in many other diseases. Of course it is impossible to state, even approximately, the number of deaths indirectly caused by this epidemic, but that it should have been so important a factor in increasing the death-rate of the State was not, perhaps, expected and would not have been revealed except through the registration of deaths. The particular diseases, or causes of death, which have been apparently increased through this cause are more clearly shown by the tables given in the registration report for the year 1890, as well as in some of the tables herewith presented. In the following table is given the number of deaths in each year from 1884 to 1890, inclusive, with percentage to each 1,000 of the population.

TABLE No. 1.

Deaths and Death-rates from 1884 to 1890, inclusive.

YEARS.	Deaths regis-tered.	Deaths to 1,000 of popula-tion.*
1884	6,194	17.26
1885	6,201	17.13
1886	6,426	17.61
1887	6,479	17.61
1888	6,854	18.48
1889	6,696	17.91
1890	7,368	19.56
Average.....	6,602	17.94

* Population estimated for all but census years.

The returns for the six years prior to 1890 are very uniform, and but for the epidemic of influenza we have reason to believe that the figures for the latter year would very closely approximate those of the preceding years. We believe that these returns are very nearly correct—indeed as near absolute correctness as it is possible to obtain under any system of registration, and that the average of these years presents accurately the death-rate of the State. A death-rate of 18—possibly a fraction over—we believe to be the average per 1,000 of the population for New Hampshire, a rate probably as low as can be found in any State in the Union, and considerably below that of some of the States. By this we do not mean to assert that New Hampshire is naturally more healthful than some other States with a higher death-rate, for in the consideration of this subject nationality, social conditions,

occupations, environments, and many other conditions must be taken into account. The average death-rate for Europe from 1865 to 1883 was 28.1 per 1,000 of the population; for Europe, excluding Russia, it was 25.8; and for Russia alone, 35.7. For Eastern Europe, 35.7; Central Europe, 28.3; Southern Europe, 25.6; Northwestern Europe, 20.5. Massachusetts for a period of thirty years ending 1888, had a mortality rate of 19.48; Austria for thirteen years ending in 1883, 31.0; and for about the same period the death-rate of Greece was 20.8; Denmark, 19.7; Sweden, 18.9; Ireland, 17.8; and Norway, 17.2. In our own country those States which have a reliable system of registration have a death-rate ranging from about 18 to 20 per 1,000 of the population. We can, therefore, upon the basis of our mortality records safely assert that New Hampshire is as healthful a State as any in the Union.

Table No. 2 shows the number of deaths and the death-rate per 1,000 of the population, by counties, for the years 1884 to 1890, inclusive. The highest death-rate has usually been in Hillsborough county, while the lowest, as a rule, has been in Coös. In 1890, the death-rate of Rockingham county was 21.45; Strafford, 20.83; Belknap, 18.40; Carroll, 16.71; Merrimack, 19.88; Hillsborough, 21.14; Cheshire, 18.48; Sullivan, 19.81; Grafton, 17.49; and Coös, 14.17, and the average for the entire State, 19.56. Rockingham, Hillsborough, and Strafford counties present very high rates for the year 1890, while the rate for Coös county is quite low.

TABLE No. 2.
Deaths and Death-rates, by Counties, from 1884 to 1890, inclusive.*

COUNTIES.	1884.		1885.		1886.		1887.		1888.		1889.		1890.	
	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.
Rockingham	873	17.69	911	18.43	963	19.46	876	17.67	896	18.05	875	17.61	1,065	21.45
Strafford	627	17.07	619	16.73	609	16.33	673	17.91	688	18.17	691	18.11	801	20.83
Belknap	285	15.09	289	15.12	302	18.71	369	18.84	392	19.78	389	19.40	374	18.40
Carroll	333	18.31	269	14.80	303	16.68	294	16.20	328	18.08	298	16.44	303	16.71
Merrimack	736	15.48	796	16.63	833	17.29	835	17.22	920	18.86	891	18.15	983	19.88
Hillsborough	1,655	20.02	1,701	20.15	1,681	19.51	1,697	19.38	1,846	20.59	1,740	19.04	1,973	21.14
Cheshire	497	17.06	494	16.90	475	16.19	482	16.39	488	16.52	525	17.72	557	18.49
Sullivan	273	15.32	284	16.02	328	18.59	283	16.12	327	18.72	314	18.06	332	19.81
Grafton	652	17.06	611	16.05	616	16.24	602	15.93	655	17.35	625	16.67	651	17.49
Cooks	263	12.88	227	10.87	256	12.00	368	16.89	314	14.11	348	15.32	329	14.17
Total	6,194	17.26	6,201	17.13	6,426	17.61	6,479	17.61	6,854	18.48	6,696	17.91	7,368	19.56

* Population estimated for all but census years.

TABLE No. 3.

*Percentages of Deaths, by Quarters, from 1884 to 1890, inclusive.**

YEARS.	Percentage of deaths for quarters ending with			
	March.	June.	Sept'mb'r.	December.
1884.....	23.23	23.40	26.63	26.74
1885.....	27.27	26.66	24.32	21.75
1886.....	23.75	23.27	28.90	24.08
1887.....	24.56	24.02	27.77	23.65
1888.....	25.94	23.72	26.82	23.52
1889.....	23.70	24.16	27.38	24.76
1890.....	28.82	21.63	26.71	22.84

* Not including deaths with month not stated, premature and still births.

Table No. 3 shows the percentages of deaths, by quarters, from 1884 to 1890, inclusive. It will be noticed that the greatest mortality usually occurs during the quarter ending with September, while for the other three quarters it is more nearly uniform. The increased rate recorded for the third quarter of the year is doubtless due to cholera infantum, which is most prevalent during July, August, and September. For the year 1890 this order is changed and the quarter ending with March has the greatest mortality, due to the increased number of deaths from pneumonia and other diseases of the respiratory organs which prevailed during those months, and to the widespread epidemic of influenza that either as a primary cause or as a complication of those diseases produced so marked an effect upon the death-rate of the State. For the first quarter of the year the percentage of deaths to the total mortality for the year was 28.82; for the second, 21.63; for the third, 26.71; and for the last, 22.84.

TABLE No. 4.

Mortality of Males and Females compared, 1884 to 1890, inclusive.

YEARS.	Male decedents.	Female decedents.	Male decedents to 100 female decedents.	Death-rate of males to 1,000 male population.*	Death-rate of females to 1,000 of female population.*
1884	3,034	3,122	97.18	17.79	17.69
1885	2,948	3,194	92.29	17.28	18.09
1886	3,155	3,212	98.20	18.50	18.20
1887	3,174	3,267	97.15	18.61	18.51
1888	3,419	3,382	101.09	20.04	19.16
1889	3,253	3,389	95.98	19.07	19.20
1890	3,692	3,624	101.87	21.65	20.53
Average	3,239	3,312	97.79	18.99	18.77

* Population of 1880.

Table No. 4 exhibits the mortality of males and females compared for the years 1884 to 1890, inclusive. With the exception of the years 1888 and 1890, the female decedents have exceeded the males. By a comparison of the death-rates of the respective sexes to each 1,000 of the living population of that sex it will be seen that the average mortality rate of the male population is slightly higher than that of the female. These figures are based upon the census of 1880, and it may here be remarked, parenthetically, that it is to be regretted that the classification of the sexes, census of 1890, is not yet available for use; therefore the deductions from this table, as well as from a few others are not so accurate as they otherwise might have been.

TABLE No. 5.

*Deaths at Age Periods by Percentages, from 1883 to 1890, inclusive.**

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	Over 60.
1883	14.13	7.58	2.56	5.55	8.58	6.73	6.22	7.64	37.93
1884	16.22	7.36	2.61	5.30	7.93	6.26	6.33	7.75	38.38
1885	15.98	7.14	2.11	4.42	7.50	6.71	6.71	7.76	40.09
1886	16.89	7.70	2.86	4.82	7.73	6.55	6.12	7.47	38.86
1887	17.64	7.26	2.05	4.89	6.96	6.25	6.56	7.72	39.70
1888	19.23	7.63	2.04	4.93	7.07	6.00	5.53	7.57	38.72
1889	19.44	7.71	2.66	4.64	6.56	6.15	5.93	7.63	38.40
1890	16.23	6.67	1.99	4.28	7.04	2.12	6.62	9.17	40.49

* Not including those with age not stated, premature and still births.

TABLE No. 6.

*Deaths at Different Periods, compared with the Number Living at the Same Period, 1890.**

	Deaths 1890.	Persons living at same ages, census of 1880.	Death-rate per 1,000.
Under 1 year.....	1,146	6,141	186.61
Under 5 years.....	1,614	30,573	52.79
20 to 30 years.....	492	63,252	7.77
All others.....	5,000	253,166	19.74
All ages.....	7,106	376,530†	18.87

* Excluding still births and premature births. † Census of 1890.

Table 6 exhibits the number of deaths at different age periods compared with the number living at the same period, based upon the census of 1880, with the exception noted in the table. This table shows a death-rate per 1,000 of the population under one year of age, of 186.61 as against 165.14 for the preceding year; under five years of age, 52.79 as against 50.04 for 1889; between twenty and thirty, 7.77 in 1890, and 6.94 in 1889; all others, 19.74 in 1890, and 17.53 in 1889; for all ages the rate was 18.87 in 1890, and 18.46 in 1889.

TABLE No. 7.

*Deaths by Ages and Sex, from 1884 to 1890, inclusive.**

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown.
1884.. Males	460	243	72	136	224	168	180	245	322	502	292	30	1	60
Females	353	212	90	192	266	220	211	235	336	444	379	70	...	51
Not stated	3	1	...	...	1	...	1	...	1	...	...	...	...	4
Total	816	456	162	328	491	388	392	480	659	946	671	100	1	115
1885.. Males	416	225	62	109	190	181	190	252	394	478	284	32	1	43
Females	371	217	68	164	275	235	226	225	355	463	398	74	2	50
Not stated	18	1	1	1	...	...	...	4	2	3	...	...	...	5
Total	805	443	131	274	465	416	416	481	751	944	682	106	3	98
1886.. Males	487	273	94	132	205	188	198	228	368	499	317	42	2	33
Females	385	221	90	178	292	233	195	252	339	447	397	83	3	28
Not stated	19	1	...	...	...	...	...	...	...	...	...	...	...	3
Total	891	495	184	310	497	421	393	480	707	946	714	125	5	64
1887.. Males	490	231	71	142	196	184	186	251	377	512	336	45	1	34
Females	416	239	61	175	255	221	239	246	358	494	350	93	6	28
Not stated	8	...	1	...	...	...	...	...	...	...	...	...	...	1
Total	914	470	133	317	451	405	425	500	735	1,006	686	138	7	63

1888..	Males.....	588	280	75	144	213	177	180	257	392	507	377	47	1	57
	Females.....	459	243	65	194	271	241	199	262	375	511	360	79	5	23
	Not stated.....	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
	Total	1,060	523	140	338	484	418	379	519	767	1,018	737	126	6	81
1889..	Males.....	536	269	90	131	187	186	175	241	381	492	342	43	...	29
	Females.....	470	245	88	179	251	226	222	270	398	471	366	75	3	29
	Not stated.....	8	2	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	1
	Total	1,014	516	178	311	439	412	397	511	779	963	708	118	3	59
1890..	Males.....	609	250	73	143	229	242	220	308	422	576	368	52	...	59
	Females.....	524	216	66	156	263	277	242	332	399	513	406	86	5	44
	Not stated.....	13	2	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	10
	Total	1,146	468	139	299	492	519	462	640	821	1,090	774	138	5	113

* Excluding still births and premature births.

Table 7 shows the number of deaths at different age periods by sex, from 1884 to 1890, inclusive. In the year 1890 there were returned 1,146 deaths of children under one year of age, not including still and premature births; 468, between one and five; 138, between five and ten; 299, between ten and twenty; 492, between twenty and thirty; 519, between thirty and forty; 462, between forty and fifty; 640, between fifty and sixty; 821, between sixty and seventy; 1,090, between seventy and eighty; 774, between eighty and ninety; 138, between ninety and one hundred; and five, over one hundred years of age; also, 113, with age not stated. Compared with the returns for the previous year, there was an increased mortality in decedents under one year of age, while the increase in the mortality at each age period from twenty years upward is very noticeable.

Table 8 shows the percentages of deaths, by age periods and sex, to the total mortality from 1884 to 1890, inclusive. Tables 7 and 8 are interesting and instructive inasmuch as they give the number of deaths and the percentage to the total mortality by age periods, for the seven years embraced in the tables. There are no other tables that so emphatically exhibit the large mortality that annually occurs among children under one year of age. It will be seen that nearly one fourth of all the deaths in the State for the year 1890 were of children under five years of age, and the same is true every year. This excessive mortality among the young offers a subject for reflection and study for those who are interested or engaged in efforts to reduce the mortality rate of the State. It is admitted by those who have given the subject any attention that so large a death-rate among children is entirely preventable, and that the means are at the command of the individual and the public to reduce these figures very materially. This view is emphatically corroborated by a detailed exhibit of the causes of death among children.

TABLE No. 8.

*Percentages of Deaths by Ages and Sex to Total Mortality, from 1884 to 1890, inclusive.**

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.
1884.. Males	16.00	8.45	2.51	4.73	7.79	5.84	6.26	8.52	11.20	17.46	10.16	1.04	.04
Females	11.74	7.05	2.99	6.38	8.84	7.31	7.02	7.81	11.17	14.76	12.60	2.33	...
Total	13.82	7.73	2.75	5.57	8.33	6.60	6.65	8.16	11.18	16.08	11.41	1.70	.02
1885.. Males	14.78	8.00	2.20	3.87	6.75	6.43	6.75	8.96	14.00	16.99	10.09	1.14	.04
Females	12.07	7.06	2.21	5.34	8.95	7.65	7.35	7.32	11.55	15.07	12.95	2.41	.07
Total	13.37	7.51	2.21	4.64	7.95	7.07	7.07	8.10	12.72	15.98	11.58	1.80	.05
1886.. Males	16.06	9.00	3.10	4.35	6.75	6.20	6.53	7.52	12.13	16.45	10.45	1.39	.07
Females	12.36	7.10	2.89	5.71	9.37	7.48	6.26	8.09	10.88	14.35	12.74	2.67	.10
Total	14.18	8.04	2.99	5.04	8.08	6.85	6.39	7.81	11.50	15.39	11.62	2.03	.08
1887.. Males	16.20	7.64	2.35	4.69	6.48	6.08	6.15	8.40	12.46	16.92	11.11	1.49	.03
Females	13.19	7.58	1.94	5.55	8.09	7.01	7.58	7.80	11.35	15.67	11.10	2.95	.19
Total	14.67	7.61	2.14	5.13	7.30	6.56	6.88	8.09	11.90	16.28	11.10	2.23	.11
1888.. Males	18.16	8.65	2.31	4.45	6.58	5.47	5.56	7.94	12.10	15.66	11.64	1.45	.03
Females	14.06	7.45	1.99	5.94	8.30	7.38	6.10	8.03	11.49	15.66	11.03	2.42	.15
Total	16.10	8.04	2.15	5.20	7.44	6.43	5.83	7.98	11.80	15.66	11.34	1.94	.09

* Excluding those with age and sex not stated, and premature and still births.

CAUSES OF DEATH.

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TABLE No. 8. — *Continued.*
Percentages of Deaths by Ages and Sex, to Total Mortality from 1881 to 1890, inclusive.

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.
1889.. Males	17.44	8.75	2.93	4.26	6.09	6.05	5.70	7.84	12.40	16.01	11.13	1.40	....
Females	14.40	7.51	2.70	5.48	7.69	6.92	6.80	8.27	12.20	14.43	11.21	2.30	.09
Total	15.88	8.11	2.81	4.89	6.91	6.50	6.27	8.06	12.29	15.20	11.17	1.86	.05
1890.. Males	17.44	7.15	2.09	4.09	6.55	6.93	6.30	8.82	12.08	16.49	10.54	1.49	....
Females	15.03	6.19	1.89	4.47	7.54	7.94	6.94	9.52	11.45	14.72	11.65	2.46	.14
Total	16.23	6.67	1.99	4.28	7.04	7.43	6.62	9.17	11.76	15.60	11.09	1.97	.07

TABLE No. 9.

Deaths of Children under Five Years of Age, by Seasons, 1890.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Months	132	81	109	90	76	91	197	289	228	120	112	89
Quarters	322			257			714			321		
Percentages . . .	19.95			15.92			44.23			19.88		
Half-years . . .				579						1,035		
Percentages . . .				35.87						64.12		
Total deaths . .							1,614					

This table represents the mortality of children under five years of age, by seasons, for the year 1890. The greatest mortality of the year occurred in the quarter embracing the months of July, August, and September, and was 44.23 per cent of the total mortality among children, as against 19.95 per cent for the first quarter, 15.92 per cent for the second, and 19.88 per cent for the last quarter of the year. There were 1,614 deaths among children under five years of age during the year.

TABLE No. 10.

*Deaths by Seasons, 1890.**

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Months	897	567	582	520	515	500	604	666	626	562	537	522
Quarters	2,046				1,535				1,896		1,621	
Percentages . .	28.82				21.63				26.71		22.83	
Half-years . .			3,581						3,517			
Percentages . .			50.45						49.54			
Total deaths .					7,098							

* Not including deaths with month not stated, premature and still births.

This table gives the total number of deaths at all ages, by seasons, for the year 1890. There was a total of 7,098 deaths, not including those with month not stated, premature and still births. The greatest mortality was in the month of January, 897, and the least, 500, in June. The percentages, by quarters, were as follows: First quarter, 28.82 per cent of the total; second, 21.63; third, 26.71; and fourth, 22.83.

TABLE No. 11.

Nativity of Persons Deceased for 1890, by Counties.

COUNTIES.	Total deaths.*	Native-born.		Foreign-born.	
		Deaths.	Percentages.	Deaths.	Percentages.
Rockingham	1,065	809	89.29	97	10.71
Strafford	801	613	82.06	134	17.94
Belknap	374	294	91.02	29	8.98
Carroll	303	251	95.80	11	4.20
Merrimack	983	779	88.12	105	11.88
Hillsborough	1,973	1,457	80.36	356	19.64
Cheshire	557	452	91.13	44	8.87
Sullivan	332	279	91.18	27	8.82
Grafton	651	519	93.68	35	6.32
Coös	329	219	81.11	51	18.89
Total	7,368	5,672	86.45	889	13.55

* Including those whose nativity was not recorded. In the calculations of percentages, the rates are not given to the *total* reported deaths, but only to the total of those cases where the nativity was stated.

This table gives the nativity of the decedents for the year 1890, together with the percentages of each, by counties. The greatest number of foreign-born decedents, as well as the highest rate, was in Hillsborough county, where there is a larger foreign-born population, being 356 or 19.64 per cent; Strafford follows with 134, although the rate, 17.94, is not so high as in Coös where there were 51 deaths and a rate of 18.89; Merrimack county had 105 deaths among the foreign-

born population and a rate of 11.88; Rockingham, 97, and a rate of 10.71; Cheshire, 44, and a rate of 8.87; Belknap, 29, and a rate of 8.98; Grafton, 35, and a rate of 6.32; Sullivan, 27, and a rate of 8.82; and Carroll, 11, with a rate of 4.20. The total foreign-born decedents for the State was 889, a rate of 13.55.

TABLE No. 12.

Nativity of Persons Deceased from 1884 to 1890, inclusive.

YEARS.	Total deaths.*	Native-born.		Foreign-born.	
		Deaths.	Percentages.	Deaths.	Percentages.
1884	6,194	4,868	89.01	601	10.99
1885	6,201	4,847	89.35	578	10.65
1886	6,426	4,989	88.52	647	11.48
1887	6,479	5,131	88.03	698	11.97
1888	6,854	5,449	87.53	776	12.47
1889	6,696	5,383	88.00	734	12.00
1890	7,368	5,672	86.45	889	13.55

* Including those whose nativity was not recorded. In the calculations of percentages, the ratios are not given to the *total* reported deaths, but only to the total of those cases where the nativity was stated.

Table No. 12 shows the number of native and foreign-born decedents in the State for each year from 1884 to 1890, inclusive, with percentages of each. Of a total of 7,368 deaths in the State, 5,672, or 86.45 per cent, were native born, and 889, or 13.55 per cent, foreign-born. In 807 cases the nativity was not given, but doubtless belonged largely to the foreign-born.

TABLE No. 13.
Deaths in 1890, Aged One Hundred Years, or more.

Date of death.	NAME.	Age.			Place of death.	Birthplace.	Single, married, or widowed.
		Years.	Months.	Days.			
July 30.....	Sally Brown.....	105	1	15	Chichester	Epping	Widow.
Sept. 19.....	Clarissa Wilson	101	4	5	Hillsborough Br... ..	Hillsborough	Widow.
Nov. 2.....	Clarissa H. Towne.....	100	8	21	Milford	Concord	Widow.
Jan. 24.....	Mary Harrington	102			Manchester	Ireland	Widow.
Feb. 20.....	Mrs. Buckman.....	100	6	7	Lancaster.....		

Table 13 presents a list of the centenarians who died during the year 1890, all females. In 1889 there were three, one male and two females, who had reached the age of 100 years or over.

CAUSES OF DEATH.

There were returned for the year 1890, 7,368 deaths — 3,692 males, 3,624 females, and 52 with sex not stated. In 337 cases the cause of death was unclassified or not stated: this was due in many cases either to the neglect of the physician to return the cause in his certificate of death, failure of the local registrar to comprehend or decipher the term given in the physician's certificate, or the use of some meaningless term, such as "hemorrhage" or "inflammation," which it was impossible to classify without knowing the organ or organs affected. The term "heart failure" is used by some in such an indiscriminate manner as to give no information whatever, except the bare fact of death.

TABLE No. 14.

Causes of Death, by Classes, 1884 to 1890, inclusive.

	1884.	1885.	1886.	1887.	1888.	1889.	1890.
I. — Zymotic diseases.	907	890	1,095	1,073	1,097	1,172	1,155
II. — Constitutional diseases.	1,276	1,271	1,284	1,222	1,200	1,114	1,309
III. — Local diseases	2,594	2,637	2,610	2,731	2,994	2,852	3,146
IV. — Developmental diseases	857	848	948	952	1,016	1,041	1,150
V. — Violent deaths	201	225	206	218	234	233	271

This table gives the causes of death by classes for the years 1884 to 1890, inclusive. It will be noticed that in 1890 there was quite a marked increase in the number of deaths from constitutional, local, and developmental diseases. Comparing the record of 1890 with that of the preceding year it will be seen that there was a slight falling off in the zymotic

diseases, a class generally believed to be more readily avoided or prevented than any other. The increased mortality from diseases of the second, third, and fourth classes is doubtless due largely if not entirely to the prevalence of epidemic influenza. In class five, violent deaths, there is a remarkable uniformity from year to year.

TABLE No. 15.

*Percentage of Causes of Death, by Classes, 1884 to 1890, inclusive.**

YEARS.	Classes.				
	Zymotic.	Constitutional.	Local.	Developmental.	Violent deaths.
1884	15.9	22.4	45.7	12.3	3.5
1885	13.9	22.2	46.0	12.2	3.6
1886	18.2	21.4	43.4	13.4	3.4
1887	17.9	20.4	45.7	12.1	3.6
1888	17.4	19.1	47.6	12.0	3.7
1889	19.1	18.2	46.5	12.3	3.8
1890	17.0	19.3	46.5	13.1	4.0

* Excluding deaths from unspecified causes, premature and still births.

Table 15 gives the percentages of causes of death, by classes, excluding deaths from unspecified causes, premature and still births from the year 1884 to 1890, inclusive. This table presents substantially the same information as table 14, but in the form of percentages. The relative fatality of each class of diseases is vividly shown. The falling off in the zymotic diseases in 1890, reduced the percentage from 19.1 to 17.0 in 1890, while the other classes show a greater or less increase.

TABLE No. 16.
Causes of Death, by Classes and Counties, 1890.

COUNTIES.	Zymotic.		Constitutional.		Local.		Develop- mental.		Violent.		Unspecified.		Total.
	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	Number.	Percentage.	
Rockingham	127	11.92	212	19.90	467	43.85	144	13.52	40	3.76	75	7.04	1,065
Strafford	149	18.60	156	19.47	307	38.33	130	16.23	17	2.12	42	5.24	801
Belknap	64	17.11	65	17.37	150	40.10	63	16.84	21	5.61	11	2.94	374
Carroll	21	6.93	50	16.50	166	54.78	36	11.88	9	2.97	21	6.93	303
Merrimack	107	10.88	192	19.53	491	49.95	130	13.22	25	2.54	38	3.87	983
Hillsborough	435	22.05	312	15.82	737	38.87	338	17.13	57	2.88	94	4.76	1,973
Cheshire	98	17.59	78	14.00	236	42.36	87	15.62	38	6.82	20	3.59	557
Sullivan	36	10.81	68	20.48	153	46.08	53	15.96	16	4.81	6	1.80	332
Grafton	72	11.06	113	17.36	301	46.23	119	18.22	26	3.99	20	3.07	651
Cooks	46	13.98	63	19.14	138	41.94	50	15.19	22	6.68	10	3.03	329
Total	1,155	15.67	1,309	17.76	3,146	42.70	1,150	15.61	271	3.68	337	4.58	7,368

This table gives the causes of death, by classes and counties, for 1890, with the percentages of each to the total number of deaths, and including deaths from unspecified causes, premature and still births, which accounts for the differences in the percentages in tables 15 and 16; the former gives the percentage of each class to the total number of specified causes, excluding premature and still births, while the latter gives the percentage of each class to the total number of all classes. The highest percentage in the zymotic class is in Hillsborough county, 22.05; Strafford, 18.60; Cheshire, 17.59; Belknap, 17.11; Coös, 13.98; Rockingham, 11.92; Grafton, 11.06; Merrimack, 10.88; Sullivan, 10.84; and the lowest in Carroll county, 6.93. The percentage of deaths in this class for the entire State was 15.67 to the total mortality, as against 17.50 for 1889.

The percentages in the class of constitutional diseases do not vary so much in the different counties, the highest rate being 20.48 in Sullivan county, followed by 19.90 in Rockingham, 19.53 in Merrimack, 19.47 in Strafford, 19.14 in Coös, 17.37 in Belknap, 17.36 in Grafton, 16.50 in Carroll, 15.82 in Hillsborough, and the lowest, 14.00 in Cheshire. The percentage of this class for the whole State was 17.76 in 1890, and 16.63 the previous year.

In the class of local diseases the highest rate was in Carroll county, 54.78; Merrimack, 49.95; Grafton, 46.23; Sullivan, 46.08; Rockingham, 43.85; Cheshire, 42.36; Belknap, 40.10; Hillsborough, 38.87; and Strafford, 38.33. Rate for the State, 42.70 in 1890 and 42.59 the preceding year.

In developmental diseases the rate is very uniform throughout the State. Grafton county has the highest rate of the year, 18.22, then follow Hillsborough county with a rate of 17.13; Belknap, 16.84; Strafford, 16.23; Sullivan, 15.96; Cheshire, 15.62; Coös, 15.19; Rockingham, 13.52; Merrimack, 13.22; and Carroll, 11.88. Rate for the State, 15.61. In 1889 the rate was 15.54.

There were 271 violent deaths, being 3.68 per cent of the total mortality of the State. Of these 217 were reported

under accident or negligence, 6 homicide, 38 suicide, and 10 from other violent causes.

TABLE No. 17.

Mortality from Prominent Zymotic Diseases from 1884 to 1890, inclusive.

YEARS.	Diseases.												
	Cholera infantum.	Croup.	Diarrhea.	Diphtheria.	Dysentery.	Erysipelas.	Fever, cerebro-spinal.	Fever, typhoid.*	Measles.	Pertussis.	Scarlatina.	Septicæmia.	Total.
1884.....	266	49	53	110	80	19	25	137	3	14	52	27	835
1885.....	219	74	59	78	40	25	20	136	45	25	53	38	812
1886.....	362	64	38	156	79	18	26	194	18	26	21	27	1,029
1887.....	336	84	38	177	53	20	34	134	39	21	26	30	992
1888.....	370	94	50	103	63	36	34	150	55	23	34	29	1,041
1889... ..	353	88	68	210	67	27	25	161	16	47	18	29	1,109
1890.....	399	64	50	164	48	29	...	143	9	26	16	57	1,005
Average ...	329	73	50	142	61	25	23	151	26	26	31	34	974

* Including fever, bilious, and typho-malarial fever.

Table 17 exhibits the mortality from prominent zymotic diseases. Cholera infantum was the cause of more than one third of all the deaths in this class, 399 in a total of 1,005, and more than reported in any preceding year; typhoid fever caused 143 deaths, a smaller number than has been reported from this cause since 1885, with one exception, 134 in 1887, and the average for the past six years has been 151. Diphtheria ranks

second in this class for the year 1890, having caused 164 deaths; the largest number reported in the past seven years was in 1889 when there were 210 deaths from this cause, the average being 142. There were 64 deaths from croup, the same as reported in 1886 and less than has been recorded in any one year since that date; the average for the past seven years has been 73. The other diseases in this table are considered under special heads.

TABLE No. 18.

Mortality from Principal Constitutional Diseases from 1884 to 1890, inclusive.

YEARS.	Diseases.										
	Dropsy.	Anæmia.	Cancer.	Mortification.	Rheumatism.	Scrofula.	Tabes mesenterica.	Phthisis (pulmonary).	Hydrocephalus.	Tubercular meningitis.	Total.
1884	80	43	213	18	26	26	4	865	27	*	1,302
1885	90	32	212	24	28	22	2	857	25	*	1,292
1886	83	28	206	27	47	16	11	809	33	19	1,279
1887	79	17	218	29	47	16	7	766	23	16	1,218
1888	75	34	203	22	43	21	14	742	30	13	1,197
1889	62	40	213	21	43	22	13	651	21	24	1,110
1890	53	28	276	33	30	15	6	825	13	30	1,309
Average	74	31	223	24	37	19	8	787	24	14	1,243

* Not classed separately.

The mortality from the principal constitutional diseases from 1884 to 1890, inclusive, are shown in this table.

Phthisis stands at the head of all the diseases as a cause of death, the record for the year 1890 being 825 deaths from this cause alone. This is the largest number reported since 1885 when there were 857 deaths recorded; in 1886, there were 809 deaths; in 1887, 766; in 1888, 742; and in 1889, there was the smallest number reported in the past seven years, 651, the average being 787. There was also an unusual increase in the mortality from cancer, there being 276 cases during the year 1890. The records of this disease for the six years prior to 1890 are very uniform and the largest number previously reported was 218 in 1887. The average for seven years has been 223 cases.

TABLE No. 19.

Mortality from Principal Local Diseases, 1884 to 1890, inclusive.

YEARS.	Diseases.													
	Apoplexy.	Paralysis.	Convulsions.	Cephalitis.*	Brain disease.	Heart disease.	Bronchitis.	Pneumonia.	Enteritis.	Gastritis.	Peritonitis.	Liver disease.	Bright's disease, nephritis, and other kidney diseases.	Total.
1884	192	248	99	120	134	507	78	436	69	44	61	63	140	2,191
1885	206	278	93	133	122	489	112	504	57	49	44	63	157	2,307
1886	220	249	71	141	127	510	81	466	53	66	48	71	143	2,246
1887	210	253	64	117	121	552	114	556	57	54	48	69	163	2,384
1888	243	273	88	143	112	575	142	628	39	51	63	72	154	2,634
1889	259	196	76	151	126	564	127	582	56	42	57	56	200	2,492
1890	263	251	65	186	140	568	194	703	63	60	51	56	201	2,801
Average	227	249	79	141	126	537	121	553	56	52	53	64	165	2,435

* Meningitis and cerebritis included.

Table 19 records the mortality from the principal local diseases from 1884 to 1890, inclusive, and an average for seven years of 2,435 cases in this class. Pneumonia was the most fatal disease in this class for the year 1890, 703 deaths, more than ever before returned from this cause; in 1888, there were 628 deaths; in 1889, 582; in 1887, 556; in 1885, 504; in 1886, 466; and in 1884, 436; the average for seven years ending with 1890 has been 553 deaths from this cause. Heart disease ranks next with 568 deaths in 1890 and an average of 537 for seven years; then follow apoplexy with 263 deaths in 1890 and an average of 227; paralysis, 251 in 1890 and an average of 249; Bright's disease and other kidney diseases, 201 in 1890 and an average of 165; cephalitis, 186 in 1890 and an average of 141; brain disease, 140 in 1890 and an average of 126; bronchitis, 194 in 1890 and an average of 121; convulsions, 65 in 1890 and an average of 79; enteritis, 63 and an average of 56; gastritis, 60 and an average of 52, and peritonitis with 51 in 1890 and an average of 53.

TABLE No. 20.

Mortality from Principal Developmental Diseases from 1884 to 1890, inclusive.

YEARS.	Diseases.									
	Still-born.	Debility, infantile.	Debility, premature-birth.	Malformations.	Teething.	Innutrition.	Childbirth.	Old age.	Atrophy and debility.	Total.
1884	156	*	35	13	19	*	27	457	144	851
1885	145	*	39	13	13	*	31	420	167	828
1886	140	68	54	12	16	50	30	468	98	936
1887	166	56	63	10	20	76	27	449	78	945
1888	189	91	69	19	20	81	20	407	112	1,008
1889	220	79	68	24	18	63	27	426	104	1,029
1890	197	113	65	11	15	95	28	410	204	1,138
Average ...	173	58	56	14	16	52	25	433	129	976

* Classed with atrophy and debility.

The above table shows the mortality from the principal developmental diseases from 1884 to 1890, inclusive. Four hundred and ten deaths were classed under old age in 1890 and an average of 433 for seven years; 204, under atrophy and debility and an average of 129; 197, still-born and an average of 173; under innutrition, 95 with an average of 52; infantile debility, 113 and an average of 58.

TABLE No. 21.

Mortality from Twenty Prominent Causes, 1884 to 1890, inclusive.

CAUSES OF DEATH.	Deaths in 1890.	Order of Fatality.						
		1890.	1889.	1888.	1887.	1886.	1885.	1884.
Consumption	825	1	1	1	1	1	1	1
Pneumonia	703	2	2	2	3	5	2	5
Heart disease.....	568	3	3	3	2	2	4	2
Apoplexy and paralysis	514	4	4	4	4	3	3	4*
Old age	410	5	5	5	5	4	5	3
Cholera infantum	399	6	6	6	6	6	6	6
Cancer	276	7	7	7	7	7	7	7
Diphtheria	164	12	8	15	9	10	18	13
Accident and negligence ...	217	8	9	8	8	9	8	11
Typhoid fever*	143	13	10	9	10	8	9	10
Cephalitis †	186	11	11	10	12	11	10	12
Diarrhea and dysentery	98	17	12	12	14	13	15	9
Bright's disease	111	16	13	20	15	15	14	14
Bronchitis	194	10	14	11	13	17	12	17
Brain disease	140	14	15	13	11	12	11	8
Atrophy and debility	204	9	16	14	18	14	13	18
Croup	64	21	17	16	16	21	19	22
Debility, infantile	113	15	18	17	23	22	‡	....
Convulsions.	65	20	19	18	21	19	16	15
Innutrition	95	18	20	19	19	23	‡	....
Influenza	94	19	....	....	....	....	....	....

* Fever, bilious fever, and typho-malarial fever included.

† Meningitis and cerebritis included. ‡ Classed with atrophy and debility.

DIAGRAM NO. 1.—SHOWING THE COMPARATIVE MORTALITY, BY ABSOLUTE NUMBER OF DECEDENTS, FROM TWENTY PROMINENT CAUSES OF DEATH DURING YEAR ENDING DECEMBER 31, 1890.

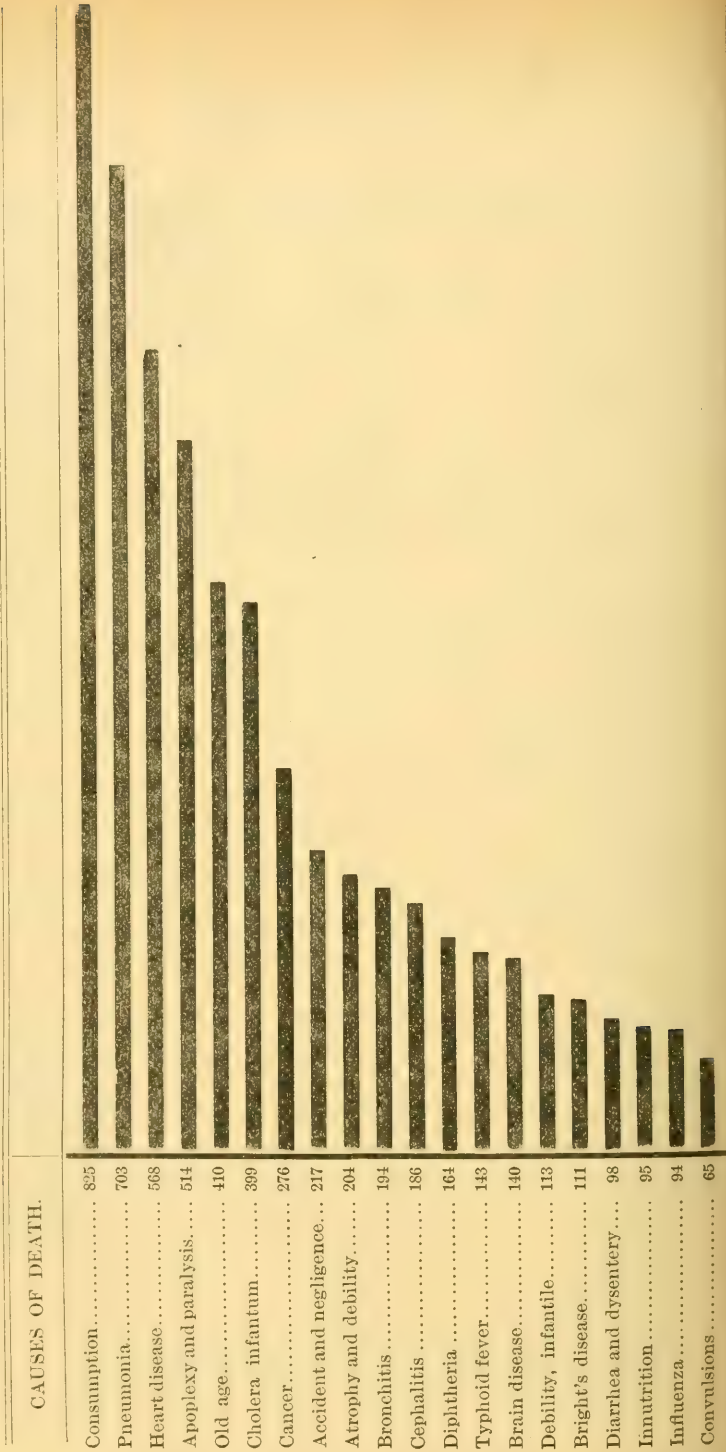


Table 21 gives a comparative view of the mortality from twenty prominent causes of death from 1884 to 1890, inclusive. This table together with the diagram that follows, is interesting in studying the relative positions of the more prominent causes of death from year to year. Consumption in this State, as well as in this and every other country within the pale of civilization, causes more deaths annually than any other disease. Next in order comes pneumonia, although it has not always held second position; in 1887 it was third, and in 1886 and 1884 it was fifth in order of fatality. Heart disease ranks third in 1890, has three times during the seven years given, held second place and once dropped to fourth. Apoplexy and paralysis have been fourth in order with the exception of two years, 1886 and 1885, when they were third. Old age has varied from the third to the fifth position, usually holding the latter place. Cholera infantum has steadily held sixth position and cancer, seventh. Accident and negligence is eighth in the list for 1890 and has varied from that place to the eleventh in 1884. Atrophy and debility, ninth in 1890, shows a large increase over the records of former years; in 1884 and 1887 it was eighteenth in order; in 1889, sixteenth; in 1886 and 1888, fourteenth; and in 1885, thirteenth. This advance is another evidence of the subtle influence of la grippe. Bronchitis was tenth in order in 1890, the highest place it has held during the seven years recorded. Cephalitis was eleventh in order and has not been subject to very great changes. Diphtheria was twelfth in 1890 as against eighth in 1889, ninth in 1887, tenth in 1886, thirteenth in 1884, fifteenth in 1888, and eighteenth in 1885. Typhoid fever has dropped from eighth place in 1886 to thirteenth in 1890, the lowest it has ever been. Brain disease is fourteenth in the list as against fifteenth in 1889, thirteenth in 1888, twelfth in 1886, eleventh in 1887 and 1885, and eighth in 1884. Infantile debility was fifteenth in the list of 1890, a material increase over any previous record, it being seventeenth in 1888, and from the eighteenth to twenty-third in other years. Bright's disease, sixteenth in 1890, was thirteenth in 1889, fourteenth

in 1884 and 1885, fifteenth in 1886 and 1887, and twentieth in 1888. Diarrhea and dysentery were seventeenth in order in 1890, and ranked as high as ninth in 1884. Influenza appears for the first time among the prominent causes of death, holding nineteenth place in the list, with a mortality of 94 as against 4 in 1889.

The long black line at the head of the diagram stands as an appalling sign of the fearful mortality from consumption. Year in and year out, it is accountable for more deaths than any other disease known to mankind. Even the terrible epidemics of cholera and yellow fever that rage in some parts of the world are not so destructive to human life as consumption is in the aggregate. In 1884, 865 deaths were reported from this disease; in 1885, 857; in 1886, 809; in 1887, 766; in 1888, 742; in 1889, 651; and in 1890, 825 cases, making an average of 787 deaths for the past seven years.

TABLE No. 22.

Mortality from Consumption from 1884 to 1890, inclusive.

YEARS.	Deaths.	Percentages of deaths to deaths from all causes.	Death-rate per 10,000 living population.
1884.....	865	14.01	24.18
1885.....	857	13.82	23.68
1886.....	809	12.58	22.17
1887.....	766	11.82	20.82
1888.....	742	10.82	20.01
1889.....	651	9.72	17.42
1890.....	825	11.19	21.91
Total.....	5,515	.....	.....
Average.....	787	11.99	21.45

The mortality from consumption, the percentage of the same to the total mortality, and the rate per 10,000 of the population, is shown in the above table, for the years 1884 to 1890, inclusive. It will be seen that there was a considerable diminution in the mortality from this disease between the years 1884 and 1889, but was largely increased in 1890. We have entertained the belief that an increased knowledge of the nature of consumption and the measures necessary to restrict and prevent it may have had some influence in causing this reduction. The increased mortality in 1890 does not weaken our opinion, and is to be accounted for, to a large extent if not wholly, by the climatic or other causes to which has been due epidemic influenza or la grippe. That this condition has been a very marked and important factor in causing the increased mortality from certain diseases, has already been shown; therefore we are disposed to attribute the large increase in the deaths from consumption in 1890, to the climatic conditions of this particular period.

TABLE No. 23.

Mortality from Consumption, by Counties, with Percentages of Deaths to Total Mortality, from 1884 to 1890, inclusive.

COUNTIES.	1884.		1885.		1886.		1887.		1888.		1889.		1890.	
	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.
Rockingham	130	11.89	134	14.70	142	14.74	130	14.81	96	10.71	88	10.05	134	12.58
Strafford	105	16.74	96	15.50	96	15.76	80	11.88	93	13.51	75	10.85	117	14.60
Belknap	54	18.91	50	17.30	37	10.22	48	13.00	46	11.73	42	10.79	40	10.69
Carroll	46	13.81	33	12.26	41	13.53	33	11.22	26	7.92	29	9.73	25	8.25
Merrimack	91	12.36	102	12.81	79	9.48	96	11.49	101	10.97	88	9.87	111	11.59
Hillsborough	229	13.83	233	13.69	218	12.96	179	10.55	209	11.32	168	9.61	201	10.33
Cheshire	62	12.47	75	15.18	60	12.63	50	10.37	47	9.63	53	10.09	51	9.15
Sullivan	36	13.18	36	12.67	45	13.72	32	11.30	36	11.00	28	8.91	32	9.63
Grafton	83	12.73	70	11.45	72	11.72	80	13.28	63	9.61	58	9.27	70	10.75
Cooks	32	12.16	28	12.33	19	7.42	38	10.32	25	7.96	22	6.32	38	11.51
Total	868	14.01	857	13.82	809	12.55	766	11.82	742	10.82	651	9.72	825	11.19

Table 23 shows the mortality from consumption, by counties, with percentages to total mortality, from 1884 to 1890, inclusive. Strafford county has the highest rate for the year 1890, 14.60 per cent; Rockingham, 12.58; Merrimack, 11.59; Coös, 11.51; Grafton, 10.75; Belknap, 10.69; Hillsborough, 10.33; Sullivan, 9.63; Cheshire, 9.15; and Carroll the lowest, 8.25.

The mortality from consumption in the cities of the State is shown in the following tables:

TABLE No. 24.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1890, for the City of Manchester.

Months .	January. 21	February. 4	March. 7	April. 5	May. 8	June. 11	July. 9	August. 9	September. 9	October. 9	November. 4	December. 10	Total.	American.	Foreign.	Not stated.	Married.	Single.	Widowed.	Not stated.
Quarters	32			24			27			23			106							
Ages ...	Under 10. 6	10 to 15. 2	15 to 20. 8	20 to 30. 37	30 to 40. 26	40 to 50. 14	50 to 60. 6	60 to 70. 2	70 to 80. 2	Over 80. 3	Not stated. 		106							
Nativity														54	46	6				
Males ..													49				14	10	1	24
Females													57				23	15	6	13

Percentage to total mortality of city, 10.29.

This table gives the deaths from consumption, by months, ages, sex, and nativity, in the city of Manchester for the year 1890. The total number of deaths from this cause was 106, as against 78 in 1889. Of these, 49 were males and 57 females; 54 were American-born, 46 foreign, and 6 nativity not stated; 14 males and 23 females were married,

10 males and 15 females single, 1 male and 6 females widowed, and the others not stated. The greatest fatality was in January, 21; June, 11; December, 10; July, August, September, and October, 9 each; May, 8; March, 7; and November, 4. Six of the decedents were under 10 years of age; 2 between 10 and 15; 8 between 15 and 20; 37 between 20 and 30; 26 between 30 and 40; 14 between 40 and 50; 6 between 50 and 60; 2 between 60 and 70; 2 between 70 and 80; and 3 over 80 years of age. The rate to the total mortality of the city was 10.29 per cent.

TABLE No. 25.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1890, for the City of Concord.

Months.	January. 4	February. 3	March. 3	April. 2	May. 2	June. 4	July. 2	August. 1	September. 3	October. 1	November. 6	December. 3	Total.	American.	Foreign.	Not stated.	Married.	Single.	Widowed.	Not stated.
Quarters	10			8			6			10			34							
Ages ...	Under 10. 2	10 to 15. 13	15 to 20. 4	20 to 30. 3	30 to 40. 8	40 to 50. 4	50 to 60. 4	60 to 70. 3	70 to 80. 4	Over 80. 1	Not stated. 6									
Nativity													34	26	3	5				
Males													16				8	7		1
Females													18				7	6	5	

Percentage to total mortality of city, 9.13.

Table 25 is the record of consumption in the city of Concord for the year 1890. There were 34 deaths from this disease — 16 males and 18 females; 26 American-born, 3 foreign, and 5 not stated; 8 males and 7 females married, 7 males and 6 females single, 5 females widowed, and 1 male civil condition not stated. Six died in November; 4 each in January

and June; 3 each in February, March, September, and December; 2 each in April, May, and July; and 1 each in August and October. None of the decedents were under 15 years of age; 2 were between 15 and 20; 13 between 20 and 30; 4 between 30 and 40; 3 between 40 and 50; 8 between 50 and 60; and 4 between 60 and 70. The rate to the total mortality of the city was 9.13 per cent.

TABLE No. 26.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1890, for the City of Nashua.

Months.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	American.	Foreign.	Not stated.	Married.	Single.	Widowed.	Not stated.
	3	3	3	3	3	4	4	2	3	2	3	4								
Quarters	9			10			9			9			37							
Ages...	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.									
	7		7	6	9	4	4						37							
Nativity	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	15	2	.....	.....	.....	.....
Males	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	.....	.....	5	7	1	..
Females	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24	.....	.....	10	10	..	4

Percentage to total mortality, 10.69.

Above is the record of the same disease in the city of Nashua for the year 1890, the total number being 37 — 13 males and 24 females; 20 American-born, 15 foreign, and 2 not stated; 5 males and 10 females married, 7 males and 10 females single, 1 male widowed, and 4 females not stated. June, July, and December had 4 deaths each; January, February, March, April, May, September, and November, 3 each; August and October, 2 each. Seven of the decedents were under 10 years of age; 7 between 15 and 20; 6

between 20 and 30; 9 between 30 and 40; 4 between 40 and 50; and 4 between 50 and 60. The percentage to the total mortality of the city was 10.69.

TABLE No. 27.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1890, for the City of Portsmouth.

Months.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	American.	Foreign.	Not stated.	Married.	Single.	Widowed.	Not stated.
	4	4	3	4	4	3	2	2	4	4	3	4								
Quarters	11			11			4			11			37							
Ages ...	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.									
				4	11	7	5	3	3	3	1		37							
Nativity														21	11	5				
Males ..													22				8	10	2	2
Females													15				5	7	1	2

Percentage to total mortality of city, 14.34.

The total mortality from consumption in the city of Portsmouth for the year 1890 was 37—22 males and 15 females; 21 American-born, 11 foreign, and 5 not stated; 8 males and 5 females married, 10 males and 7 females single, 2 males and 1 female widowed, and 2 males and 2 females civil condition not stated. In January, February, April, May, October, and December there were 4 deaths each; in March, June, and November, 3 each; and in July and August, 2 each. Four of the decedents were between 15 and 20 years of age; 11 between 20 and 30; 7 between 30 and 40; 5 between 40 and 50; 3 between 50 and 60; 3 between 60 and 70; and 3 between 70 and 80. The percentage to the total mortality of the city was 14.34.

TABLE No. 28.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1890, for the City of Dover.

Months.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	American.	Foreign.	Not stated.	Married.	Single.	Widowed.	Not stated.
	7	3	4	4	5	4	4	6	2	2	5	6								
Quarters	14			13			12			13			52							
Ages ...	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.									
	1	2	7	16	10	4	7	2	2	1			52							
Nativity	...	...	...	...	...	...	...	...	...	...	...	...		36	13	3	...	...	...	...
Males	...	...	...	...	...	...	...	...	...	...	...	...	25	...	...	8	12	1	4	
Females	...	...	...	...	...	...	...	...	...	...	...	...	27	...	...	10	8	6	3	

Percentage to total mortality of city, 16.40.

The total mortality from consumption in the city of Dover, for the year 1890, was 52—25 males and 27 females; 36 of the decedents were American-born, 13 foreign, and 3 not stated; 8 males and 10 females were married, 12 males and 8 females single, 1 male and 6 females widowed, and 4 males and 3 females with civil condition not stated. There were 7 deaths in January; August and December had 6 deaths each; May and November, 5 each; March, April, June, July, 4 each; February, 3; and September and October, 2 each. One decedent was under 10 years of age; 2 between 10 and 15; 7 between 15 and 20; 16 between 20 and 30; 10 between 30 and 40; 4 between 40 and 50; 7 between 50 and 60; 2 between 60 and 70; 2 between 70 and 80; and 1 over 80 years of age. The rate to the total mortality of the city was 16.40 per cent.

TABLE No. 29.

*Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity,
1890, for the City of Keene.*

Months.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	American.	Foreign.	Not stated.	Married.	Single.	Widowed.	Not stated.
	1	2	1	2	3	2		2	1	1	1									
Quarters	4			7			3			2			16							
Ages ...	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.									
	1		1	7		1	3	2		1			16							
Nativity														12	4					
Males ..														6			3	3		
Females														10			2	7	1	

Percentage to total mortality of city, 10.25.

The total number of deaths from consumption in the city of Keene, for the year 1890, was 16 — 6 males and 10 females; 12 American-born, and 4 foreign; 3 males and 2 females were married, 3 males and 7 females single, and 1 female widowed. Three of the deaths occurred in May; 2 each in February, April, June, and August; and 1 each in January, March, September, October, and November. One of the decedents was under 10 years of age; 1 between 15 and 20; 7 between 20 and 30; 1 between 40 and 50; 3 between 50 and 60; 2 between 60 and 70; and 1 over 80 years of age. The rate to the total mortality of the city was 10.25 per cent.

TABLE No. 30.

Percentage of Deaths from Consumption to the Total Mortality of the Cities of the State for the years 1883 to 1890, inclusive.

	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.
Manchester	14.89	14.28	13.03	15.01	11.15	12.37	9.30	10.29
Concord . . .	11.41	8.66	10.68	8.66	10.13	10.23	9.81	9.13
Nashua . . .	16.96	13.72	14.86	10.49	9.73	8.20	8.64	10.69
Dover	20.97	16.60	16.17	21.17	14.57	12.01	10.31	16.40
Portsmouth	16.02	14.74	12.18	17.84	16.26	13.26	7.73	14.34
Keene	16.91	16.00	22.80	16.00	11.90	9.47	9.62	10.25

This table presents a comparative view of the percentage of deaths from consumption to the total mortality of the respective cities of the State, from 1883 to 1890, inclusive. Dover has the highest rate, 16.40 for the year; Portsmouth follows with a rate of 14.34; Nashua, 10.69; Manchester, 10.29; Keene, 10.25; and Concord, 9.13.

Table 31 gives the mortality from consumption, by ages and sex, for the year 1890, by counties. The greatest number of deaths occurred, as usual, between the ages of 20 and 30, 200; between 30 and 40, 156; between 40 and 50, 113; between 60 and 70, 72; between 50 and 60, 65; between 70 and 80, 63; between 15 and 20, 61; under 1, 25; over 80, 23; between 1 and 5, 17; between 10 and 15, 16; and age not stated, 7. Among the decedents were two negroes.

TABLE No. 31.

Deaths from Consumption, by Ages and Sex, by Counties, for 1890.

COUNTIES.	SEX.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.	Total.	Grand Total.
Rockingham	Males	3	2	...	...	3	16	11	10	7	8	8	2	...	70	...
	Females	1	1	1	2	6	18	11	9	1	5	6	1	2	64	134
Strafford	Males	...	...	...	1	3	15	16	8	4	7	3	1	...	58	...
	Females	4	1	...	4	7	11	11	3	6	3	7	1	1	59	117
Belknap	Males	1	...	...	...	2	...	3	3	3	1	1	1	...	15	...
	Females	...	...	...	...	3	7	5	3	...	2	4	...	1	25	40
Carroll	Males	...	...	...	...	...	4	1	3	1	...	2	1	...	12	...
	Females	1	...	...	...	3	2	...	3	1	1	1	1	...	13	25
Merrimack	Males	1	...	2	1	2	12	6	8	7	7	4	3	...	53	...
	Females	1	...	1	2	3	18	9	8	5	10	4	...	...	61	114
Hillsborough	Males	5	2	1	1	4	23	21	15	11	4	5	1	1	94	...
	Females	3	6	1	1	15	31	21	13	5	8	3	3	...	110	204
Cheshire	Males	...	2	...	...	...	2	3	4	4	2	3	1	...	21	...
	Females	1	1	...	...	5	9	7	1	1	2	1	2	...	30*	51

[illegible]

* One negro.

TABLE No. 32.

Deaths from Consumption, by Months and Sex, by Counties, for 1890.

COUNTIES.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Not stated.	Total.	Grand Total.
Rockingham	Males	10	3	8	10	6	3	3	6	4	7	4	6	...	70	...
	Females	6	10	3	4	4	4	7	5	1	4	3	8	...	64	134
Strafford	Males	1	3	9	4	4	5	3	8	3	5	7	6	...	58	...
	Females	11	2	6	8	4	2	3	1	3	5	6	8	...	59	117
Belknap	Males	1	2	1	1	1	2	1	2	...	1	2	...	1	15	...
	Females	5	1	5	2	1	3	2	1	2	1	1	1	...	25	40
Carroll	Males	...	...	2	...	1	...	3	1	1	...	2	2	...	12	...
	Females	...	1	1	3	2	2	1	1	...	...	1	1	...	13	25
Merrimaek	Males	5	4	7	4	4	7	4	4	4	2	3	5	...	53	...
	Females	10	8	5	4	5	3	8	2	7	2	5	2	...	61	114
Hillsborough	Males	12	5	14	5	8	8	9	7	9	4	3	10	...	94	...
	Females	14	6	2	11	11	12	13	7	7	10	6	11	...	110	204
Cheshire	Males	4	1	1	1	2	3	1	...	...	3	3	2	...	21	...
	Females	3	2	3	3	6	2	1	4	2	2	2	...	...	30	51

Sullivan	Males . . . . .	...	1	3	1	1	1	1	2	.....	1	1	1	2	.....	13	.....
	Females	1	2	1	3	2	4	.....	.....	.....	1	1	1	2	.....	19	32
Grafton	Males	1	5	2	.....	4	2	1	2	.....	3	2	3	3	.....	28	.....
	Females	4	2	3	7	4	4	2	2	6	4	1	2	3	.....	42	70
Coös	Males	31	2	3	2	1	3	1	1	1	1	.....	1	2	.....	18	.....
	Females	51	2	2	1	3	2	2	2	.....	3	1	.....	3	.....	20	38
Total for State	Males	5	26	50	28	32	34	28	31	26	25	25	30	36	1	382	.....
	Females	5	36	31	46	42	38	39	27	30	27	27	33	39	...	443	825

Table 32 gives the deaths from consumption, by months and sex, by counties, for 1890. The greatest mortality occurred in the month of January, 90; 81 in May; 75 in December; 74 each in April and May; 72 in June; 63 in November; 67 in July; 62 in February; 58 in August; 56 in September; 52 in October; and 1 not stated. Of the decedents, 382 were males and 443 females.

TABLE No. 33.

Deaths from Consumption, by Nationality, Civil Condition, and Sex, by Counties, for 1890.

COUNTIES.	SEX.	American.	Foreign.	Not stated.	Married.	Single.	Widowed.	Not stated.	Total.	Grand Total.
Rockingham	Males.....	48	14	8	29	30	9	2	70	....
	Females....	50	8	6	33	24	4	3	64	134
Strafford	Males.....	41	14	3	27	21	3	7	58	....
	Females....	45	11	3	21	23	10	5	59	117
Belknap	Males.....	13	1	1	8	6	1	...	15	...
	Females....	16	6	3	8	11	6	...	25	40
Carroll	Males.....	11	1	...	8	2	2	...	12	....
	Females....	13	...	...	2	6	5	...	13	25
Merrimack	Males.....	44	6	3	24	20	6	3	53	....
	Females....	43	9	9	36	15	9	1	61	114
Hillsborough	Males.....	57	28	9	35	30	4	25	94	....
	Females ...	62	41	7	40	37	15	18	110	204
Cheshire	Males.....	16	4	1	11	7	3	...	21	....
	Females....	23	6	1	9	18	2	1	30	51
Sullivan	Males.....	9	3	1	4	8	1	...	13	...
	Females....	17	1	1	8	7	4	...	19	32
Grafton	Males.....	21	...	7	11	14	3	...	28	....
	Females....	35	2	5	28	9	5	...	42	70
Coös	Males... ..	13	3	2	7	6	*4	1	18	....
	Females....	7	8	5	11	5	3	1	20	38
Total for State		273	74	35	164	144	36	38	382	....
	Males..	273	74	35	164	144	36	38	382	....
	Females	311	92	40	196	155	63	29	443	825

* One divorced.

Table 33 gives the nationality, civil condition, and sex of the decedents from consumption, by counties, for 1890. Of the 825 cases, 584 were American-born, 166 foreign, and 75 not stated; 360 were married, 299 single, 98 widowed, 1 divorced, and 67 not stated.

TABLE No. 34.

Mortality from Pneumonia, by Counties, from 1884 to 1890, inclusive.

COUNTIES.	Years.							Average.
	1884.	1885.	1886.	1887.	1888.	1889.	1890.	
Rockingham	45	63	77	70	83	68	90	71
Strafford	39	48	37	46	52	38	80	48
Belknap	18	24	25	44	50	37	42	34
Carroll	30	27	15	33	46	49	37	34
Merrimack	50	72	60	85	73	86	94	74
Hillsborough	110	128	112	128	129	131	158	128
Cheshire	36	52	39	55	55	52	44	47
Sullivan	21	22	23	22	30	31	32	25
Grafton	66	48	54	52	77	64	74	62
Coös	21	20	24	21	33	26	52	28
Total	436	504	466	556	628	582	703	553

This table gives the mortality from pneumonia, by counties, from 1884 to 1890, inclusive. There were 703 deaths from this disease in 1890, a large increase over the number reported in any previous year and largely exceeding the average of the past seven years. Cheshire was the only county that did not exceed its average for the seven years noted in the table.

TABLE No. 35.

Mortality from Pneumonia, by Ages, from 1884 to 1890, inclusive.

YEARS.	Under 1 year.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.	Total.
1884	51	48	3	3	6	27	23	30	36	50	97	54	8	436
1885	69	49	8	4	11	15	27	32	37	72	105	74	1	504
1886	57	38	13	6	13	17	24	29	49	68	92	53	7	466
1887	68	33	7	5	13	28	32	40	48	89	121	68	4	556
1888	67	45	6	10	19	40	49	51	62	67	123	81	8	628
1889	61	50	8	12	17	29	36	40	48	98	100	79	4	582
1890	73	48	9	10	11	35	46	45	79	106	127	107	7	703

The mortality from pneumonia by ages, from 1884 to 1890, inclusive, is given in the above table. The greatest mortality was in the age period between 70 and 80 for the year 1890, there being 127 deaths between those ages, and this holds good in the other years noted. There were 107 deaths of persons over 80 years of age; 106 between 60 and 70; 79 between 50 and 60; 73 under 1 year of age; 46 between 30 and 40; 45 between 40 and 50; 11 between 15 and 20; 10 between 10 and 15; 9 between 5 and 10; and 7 age not stated.

TABLE No. 36.

Mortality from Pneumonia, by Months and Quarters, from 1884 to 1890, inclusive.

YEARS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Not stated.
1884	55	55	51	52	32	13	14	11	5	28	51	67	2
1885	53	59	101	95	35	25	13	10	10	33	38	32	...
1886	32	44	73	51	51	33	22	18	18	24	46	54	...
1887	71	73	85	85	49	17	13	13	14	34	47	54	1
1888	72	95	75	73	76	24	16	23	21	43	36	72	2
1889	69	66	79	102	51	22	15	19	16	53	41	49	...
1890	213	74	69	43	47	35	18	9	23	23	69	79	1
Total	565	466	533	501	341	169	111	103	107	238	328	407	6
Quarters	1,564			1,011			321			973			
Percentages	40.42			26.13			8.29			25.15			

Table 36 shows the mortality from pneumonia, by months and quarters, from 1884 to 1890, together with percentages. In 1890 the greatest number of deaths from this disease occurred in January, 213; and the aggregate of that month, for the seven years given, 565, is also larger than that of any other month. The smallest number for the year was in August, 9; and the aggregate of that month for seven years, 103, was less than that of any other; 40.42 per cent of all the deaths from pneumonia in the last seven years have occurred in the first quarter of the year; 26.13 per cent, in the second quarter; 25.15 per cent, in the fourth quarter; and 8.29, in the third quarter.

TABLE No. 37.

Mortality from Brain Diseases, 1884 to 1890, inclusive.

YEARS.	Diseases.						Total.
	Cephalitis.*	Apoplexy.	Paralysis.	Insanity.	Convulsions.	Brain disease.	
1884	120	192	248	22	99	134	815
1885	133	206	278	27	93	122	859
1886	141	220	249	24	71	127	832
1887	117	210	253	25	64	121	790
1888	143	243	273	37	88	112	896
1889	151	259	196	35	76	126	843
1890	186	263	251	28	65	140	933
Average	141	227	248	28	79	126	852

* Meningitis and cerebritis included.

There were 933 deaths from brain diseases in the year 1890, including apoplexy with 263; paralysis, 251; cephalitis, 186; convulsions, 65; insanity, 28; and other brain diseases, 140.

TABLE No. 38.

Mortality from Diarrheal Diseases, 1884 to 1890, inclusive.

YEARS.	Diseases.					Total of diarrheal diseases.
	Cholera infantum.	Cholera morbus.	Diarrhea.	Dysentery.	Enteritis.	
1884	266	21	52	80	69	488
1885	219	20	40	40	57	376
1886	362	14	38	79	53	546
1887	336	16	38	53	57	500
1888	370	8	50	63	39	530
1889	353	12	68	67	56	556
1890	399	12	..	50	63	524
Average	329	14	40	61	56	502

The total number of deaths from diarrheal diseases in 1890 was 524, a slight increase over the average for seven years. Cholera infantum stands at the head of these diseases with 399 deaths in 1890, and an average of 329; enteritis has an average of 56; dysentery, 61; diarrhea, 40; cholera morbus, 14.

TABLE No. 39.

Mortality from Cholera Infantum from 1884 to 1890, inclusive.

YEARS.	Deaths.	Percentage of deaths to deaths from all causes.	Death-rates per 10,000 living (estimated population).
1884	266	4.29	7.41
1885	219	3.53	6.05
1886	362	5.63	9.92
1887	336	5.18	9.13
1888	370	5.39	9.98
1889	353	5.27	9.44
1890	399	5.41	10.59
Average ..	329	....	....

This table shows the mortality from cholera infantum from 1884 to 1890, inclusive; also the percentage to the total mortality and the rate per 10,000 of the population. There has been an average of 329 deaths from this disease for the past seven years.

TABLE No. 40.

Mortality from Cholera Infantum, by Ages, from 1884 to 1890, inclusive.

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.	Total.
1884	214	48					1		1				2	266
1885	186	33												219
1886	283	77	2											362
1887	284	51											1	336
1888	298	70											2	370
1889	297	54	1										1	353
1890	343	52	4											399

This table shows the mortality from cholera infantum, by ages, from 1884 to 1890, inclusive. The largest number reported in any one year was 399 in 1890, followed by 370 in 1888; 362 in 1886; 353 in 1889; 336 in 1887; 266 in 1884; and 219 in 1885. In 1890 of the 399 decedents, 343 were under 1 year of age, 52 between 1 and 5, and 4 between 5 and 10 years.

TABLE No. 41.

Cholera Infantum, by Cities.

	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.
Manchester.....	131	112	88	122	148	117	86	146
Dover.....	7	10	15	15	13	19	5	12
Nashua.....	15	14	13	30	20	39	43	56
Portsmouth.....	4	3	9	6	4	9	9	8
Concord.....	9	12	5	7	8	11	13	8
Keene.....	9	6	2	7	5	2	8	5
Total for cities...	175	157	132	187	198	197	164	235
Total for State...	278	268	219	362	336	370	353	399

Table 41 shows the mortality from cholera infantum in the cities of the State. Of the 399 deaths from this disease in the year 1890, 235 occurred in the cities, 146 being recorded in Manchester; 56 in Nashua; 12 in Dover; 8 in each of the cities of Portsmouth and Concord, and 5 in Keene.

REMARKS ON CONTAGIOUS AND INFECTIOUS DISEASES.

A glance at the mortality records of the so called contagious and infectious diseases for the past few years, coupled with a knowledge of the prevalence of these diseases throughout the State for a period longer than that covered by an accurate registration, leads us to believe that the efforts of the local boards of health throughout the State, to restrict and prevent this class of diseases, have been productive of good results. It is observed by physicians that these diseases, especially typhoid fever and scarlet fever, are not so prevalent in this State as formerly. The reduction in the amount of typhoid fever is doubtless due directly to sanitary work, more

especially in the introduction of better water supplies for the general public, together with improved facilities for drainage. It is a matter of history that the introduction of a public water supply into some of the towns of this State has been followed by an almost entire disappearance of typhoid fever. In nearly every village where polluted or contaminated wells have been abandoned, typhoid fever has been reduced in a corresponding ratio. Glancing at the records of this disease we see that the largest number of deaths returned from this cause in a single year was in 1886, 194; in 1889 there were 161 deaths; in 1888, 150; in 1884, 137; in 1885, 136; in 1887, 134; and in 1890, 143. Observing physicians who have been in practice in the State for from 40 to 50 years, assert that in their judgment the prevalence of typhoid fever is not half so great as formerly, and that in some localities where it used to be very common, scarcely a case is now known. We believe that if sanitary regulations were thoroughly and intelligently enforced throughout the State, and if the people could be forced to abandon the use of polluted wells, typhoid fever could be practically banished from every community.

Scarlet fever is another disease that may be controlled by intelligent action. The mortality from this disease has been reduced to quite small proportions. In 1884 there were 52 deaths from scarlet fever in New Hampshire; in 1885, 53; in 1886, 21; in 1887, 26; in 1888, 34; in 1889, 18; and in 1890, 16. This result has been brought about wholly through the work of local health authorities, in causing the immediate isolation of every case, and the better understanding of the nature of the disease by the people themselves. This is a disease that may be effectually controlled by isolation and disinfection, and so promptly has this work been carried out in some localities that it has been restricted to a single case. Formerly scarlet fever raged through town after town in epidemic form, and no thought was given to its restriction, and its spread was frequently furthered by the very general, but erroneous idea that every child must have the disease at some time; hence parents would purposely expose their chil-

dren to a mild case of the disease, thinking it a favorable opportunity, and not realizing that a malignant case was liable to be the result of such exposure. While this low rate of mortality is very gratifying and might be reduced still lower, it is almost too much to expect that these figures can be maintained each and every year. There are periods during which the disease appears to have a thoroughly epidemic tendency, at which times it is more than ordinarily difficult to control; but the fact should not be lost sight of, that it is strictly a preventable disease, and every means known to health authorities and to families should be adopted to prevent its obtaining a foothold and to prevent its spread.

Diphtheria, a contagious and infectious disease, as well as belonging to the preventable class, shows a mortality for 1890 less than that of former years, and is more effectually under the control of health authorities than heretofore. There were 164 deaths from this cause in 1890, as against 210 in 1889. However, the mortality is still very much larger than it should be, and there is no good reason why it cannot be very materially reduced, if every health officer in the State would promptly isolate every case as soon as it appears, and thoroughly disinfect the premises afterward. The truth of this statement has been exemplified in a most convincing manner in many of our towns.

The mortality from measles for the year 1890 was 9, as against 16 the previous year, while in 1888 there were 55 deaths from this disease. The remarks made concerning scarlet fever are substantially applicable to measles. In some States it is classed as one of the dangerous diseases coming within the jurisdiction of the health authorities, and against which stringent restrictive and preventive measures are applied.

The diseases above mentioned are those which have received the especial attention of sanitarians during recent years, and the result is manifest in their lessened prevalence and mortality. This by no means implies that sanitary work has had no effect in other directions. It is well known that

anything that improves the sanitary condition of a locality, increases its healthfulness and renders it less liable to the invasion of disease. The work of the health officer is by no means restricted to the few so called contagious and infectious diseases — indeed, this is but a minor labor in the great field of sanitation. As a result of the investigations and progress in medical science during the past decade, that chief of all diseases, consumption, is transferred to the list of preventable causes of death. Against this terrible malady the united efforts of all the health officers in the civilized world should be directed, and the prospects are, that with determined and united work its terrible ravages may be very materially lessened.

Cholera infantum, which causes so many deaths, especially in the cities of Manchester and Nashua, is believed to be produced by conditions largely within the control of a health department.

The value of sanitary work has been demonstrated beyond any question of doubt, and it only remains to push on the work until there is no longer need of it; until filth and degradation, disease and premature death are supplanted by cleanliness, purity, good health, and happiness.

DUTIES OF BOARDS OF HEALTH.

By virtue of the law of the State every town has a board of health. If no action is taken regarding health officers, the selectmen, *ex officio*, constitute the board of health. A town may, and frequently does, elect a board of health or health officer; but if no action is taken by the town and the selectmen desire to appoint a board of health, they can legally do so, failing to do this they themselves must act as a board of health.

The duties of a board of health are many, exacting, important, and attended with many moral and legal responsibilities. The man who is unprepared to assume all these or who

does not recognize their full import is not fitted to be a health officer. To administer the office as though there were nothing to do but to act reluctantly upon complaints and to draw the usually meagre salary, is to confess an unfitness for the place at the outset. A board of health has duties to perform second in importance to no office within the gift of the town. There is no town, however small, that may not be benefited by an active board of health.

1. A local board of health should inform themselves fully as to the advantages, benefits, and possibilities that sanitary science has in store for all communities; the grand results for the public good that may be and frequently have been accomplished by its teachings, not only in large cities, but also in small towns, hamlets, and even isolated homes. The information may be gathered in a large degree from the reports of boards of health, which may usually be had upon application. After the appointment or election of a board of health, it should organize by choosing one of its members chairman, and another secretary, the latter of whom should keep a careful record of all the doings of the board.

2. The board should establish and promulgate rules and regulations as it may deem necessary for the better preservation of the public health. The regulations must be approved by the selectmen, recorded by the town clerk, and either printed in some newspaper published in the town or posted in two or more public places. The rules and regulations should be carefully and considerately drawn, to the end that the community for which they are intended may be benefited to the greatest possible extent. These rules have the force of law, and for the wilful violation of the same the offender may be punished by fine of \$10 for each offense. A sample set of rules and regulations are herewith appended for the guidance of such health officers as may desire to avail themselves of the suggestions contained therein :

RULES AND REGULATIONS OF THE BOARD OF
HEALTH OF THE TOWN OF ———.

In pursuance of authority given in section 1, chapter 112, Public Statutes of the State of New Hampshire, we, the undersigned, officers of the board of health of the town of ———, do hereby establish and promulgate the following rules and regulations, which we deem necessary for the better preservation of the public health and the best interests and welfare of the community, namely :

RULE 1. — PRIVIES AND WATER-CLOSETS.

No person shall occupy, lease to, or permit any other person to occupy, any building as a dwelling-house, unless such building be provided with water-closets or privies, and so constructed that none of their contents may escape, to contaminate the surrounding earth or be exposed to the light. No person shall erect, or continue, such place of easement so near to any other dwelling that it may become offensive. All privies and privy vaults shall be thoroughly cleansed at least twice a year, in the spring, not later than May first, and in the fall, not earlier than the first of October, and shall at all times, by the use of disinfectants, dry earth, etc., be kept in a cleanly and inoffensive condition. Any deviation from this order shall not be allowed except by permission of the board.

RULE 2. — DRAINAGE.

Suitable drains and sewers shall be constructed so that sink-water, or any other liquid that may by exposure become putrid and offensive, may be conveyed away and disposed of in such a manner as not to pollute or endanger the water of any spring or well by saturating the earth in the vicinity, or by contaminating the air; and if such refuse matter or sewage be collected in hogsheads, cisterns, or other receptacles, they shall at all times be deodorized and disinfected thoroughly, so as not to disturb the comfort or endanger the health of any person living near, and all persons shall thus take care of their own offal and waste upon their own land in such a manner as not to endanger the health or comfort of any one, and never suffer it to go out upon the premises of another, to their injury, or into the street or public highway. All sinks within one hundred feet of the public sewer must be connected therewith.

RULE 3. — CELLARS.

All cellars must be thoroughly cleaned and ventilated, and all decaying vegetable matter removed from the premises, by the first week in May, and kept so until the first of October. Cellars over which persons live should at all times be kept clean and sweet.

RULE 4. — COLLECTION OF OFFAL.

The collection of refuse matter in or around the immediate vicinity of any dwelling-house, place of business, or public highway—such as swill, waste of meat, fish or shells, bones, decaying vegetables, dead carcasses, excrement, or any kind of offal that may decompose and generate unhealthy gases, and thus affect the purity of the air—shall be considered the worst kind of nuisance, and is absolutely prohibited.

Such substances must be disposed of either by burial, burning, or conversion into fertilizers, and in such manner that it may not be offensive to the neighborhood wherever located.

RULE 5. — STABLES.

Stables, pig-sties, and all other places where animals or fowls are confined, if in proximity to dwelling-houses, places of business, or public highways, must be kept in a cleanly, well ventilated, inoffensive condition; and no hogs or pigs shall be kept within the thickly settled village limits, to the annoyance of any one, or the safety of the public health.

RULE 6. — OVERCROWDING TENEMENTS.

The crowding of tenement houses is prohibited, as this is one of the greatest sources of danger in generating contagious diseases. If any disease shall arise from such cause, the owners will be prosecuted in accordance with the laws of the State.

RULE 7. — OCCUPATION.

If any person shall use or occupy any building in the compact part of this town, or in the immediate vicinity of any dwelling-house, place of business, or public highway, for a slaughter-house, fish-market, for trying tallow, or for currying leather, or for the deposit of green pelts or skins, or for the carrying on of an offensive business, without permission, in writing, of the health officers of this town, he shall be guilty of maintaining a nuisance, and shall be punished accordingly as provided by law.

RULE 8. — REPORTS OF PHYSICIANS.

It shall be the duty of every physician who attends upon any person infected with the small-pox, scarlet fever, diphtheria, or typhoid fever, to immediately report the same to the health officers of this town, together with the residence of such persons so infected.

RULE 9. — REPORTS OF DEATHS.

It shall be the duty of every physician who has had a patient die of small-pox, scarlet fever, diphtheria, or typhoid fever to immediately report the death to the health officers of this town, together with the residence of said person.

RULE 10. — FUNERALS.

Public funerals are prohibited for any person who has died of small-pox, diphtheria, or scarlet fever.

RULE 11. — ATTENDING PUBLIC GATHERINGS.

It shall be unlawful for any person who has become affected with any contagious or infectious disease, or who is recovering from such disease, or for members of the same household, to attend school, church, or any public gathering, or to mingle in society in any way, until the board of health or some person designated by them, certifies that they are no longer liable to communicate said disease.

RULE 12. — ISOLATION.

Isolation of persons affected with small-pox, scarlet fever, and diphtheria is hereby ordered to be enforced immediately upon the appearance of the disease.

RULE 13. — VACCINATION.

No child shall be allowed to attend any public school without presenting a certificate of vaccination from a legally qualified physician, stating that said child, or person has been vaccinated within the last seven years.

RULE 14. — POLLUTING WATER SUPPLIES.

If any person shall place, leave, or cause to be placed or left, any substance or fluid in or near to any lake, pond, or reservoir, or stream tributary thereto, from which the water supply in whole or in part of any city, town, or village is taken for domestic purposes, that may

cause the water thereof to become impure or unfit for the uses for which it is intended, such person shall be punished as provided by law.

Any violation of these regulations may be punished by a fine of ten dollars.

Given under our hands this —— day of ——, 189 .

_____) Board
_____) of
_____) Health.

We approve the above rules and regulations.

_____ } Selectmen
 _____ } of
 _____ }

Received and recorded ———, 189 .

_____, *Town Clerk.*

These rules we believe to be generally applicable to every town in the State. It may be found necessary to incorporate other rules for special localities, or to modify those given, as circumstances may require.

3. A board of health should be an active, watchful organization; the law contemplates such. It should not confine its work merely to investigating complaints. The law distinctly states that health officers shall "inquire into all nuisances and other sources of danger to the public health," and that they shall act promptly, efficiently, and considerately in all matters relating to the public health. A board of health should be aggressive in its warfare against nuisances and other conditions endangering the physical welfare of the people within its jurisdiction.

4. The Public Statutes are now placed in a compact form so as to be readily understood by all. The various health laws which prior to this enactment were scattered through the pamphlet laws, making it very difficult for health officers to determine what the exact law was in a given case, are now condensed in chapters 107, 108, and 109 of the Public Statutes, embracing for the present the law covering nearly every case with which the health officer is called upon to deal.

Each section of these chapters is so specific that it cannot be misunderstood. The manner in which legal action is taken to abate a nuisance is clearly indicated. The following health laws, from the Public Statutes, will be in force on and after January 1, 1892 :

PUBLIC HEALTH LAWS.

CHAPTER 107.

THE PREVENTION AND REMOVAL OF NUISANCES.

SECTION 1. The health officers of towns may make regulations for the prevention and removal of nuisances, and such other regulations relating to the public health as in their judgment the health and safety of the people require, which shall take effect when approved by the selectmen, recorded by the town-clerk, and have been published in some newspaper printed in the town, or copies thereof have been posted in two or more public places in the town. Any person willfully violating such regulations shall be punished by a fine of ten dollars for each offense.

SECT. 2. The state board of health may make, in addition to the rules and regulations of the health officers of towns, such other rules and regulations, or such amendments to existing rules and regulations, as in their judgment the public good requires; and such rules and regulations shall be enforced by the health officers of towns in the same manner as other health regulations.

SECT. 3. Health officers of towns, and each of them, shall inquire into all nuisances and other causes of danger to the public health, and whenever they shall know or have cause to suspect that any nuisance or other thing injurious to the public health is in any building, vessel, or inclosure, they shall make complaint under oath to some justice, who shall issue a warrant directed to them to search such building, vessel, or inclosure; and they may in the daytime forcibly enter therein and make such search.

SECT. 4. They may notify the owner or occupant of any building, vessel, or inclosure to remove or destroy any nuisance or other thing therein deemed by them, on examination, to be injurious to the public health, within a time limited; and in case the owner or occupant, after such notice in writing, given to him or left at his abode, shall neglect to comply therewith, the health officers may forcibly enter

such building, vessel, or inclosure and cause the nuisance or other thing to be removed or destroyed.

SECT. 5. They may employ such assistants and laborers as may be necessary, and if resisted shall have the same powers as sheriffs have to command assistance; and any person willfully resisting them, or their assistants or laborers, in making the search or removing the nuisance or other thing, shall be imprisoned not exceeding twelve months, or fined not exceeding five hundred dollars.

SECT. 6. When the owner of a building, vessel, or inclosure is unknown to the health officers, or does not reside in town, and the same is unoccupied, or the occupant is, in their opinion, unable to remove the same, they may, without previous notice, immediately cause the nuisance or other thing by them deemed injurious to the public health found therein to be removed or destroyed.

SECT. 7. The owner or occupant of a building, vessel, or inclosure shall be liable to pay the expense of the removal or destruction of the nuisance or other thing, including the fees of the health officers who order or cause the same to be removed; and the same may be recovered by action brought by the health officers in the name of the town.

SECT. 8. No person shall occupy, lease to any other person, or permit any other person to occupy, a building or any part of a building within the compact part of a city or town as a dwelling-house, office, store, shop, or sleeping apartment unless such building shall be provided with suitable privies and vaults properly ventilated and constructed, and kept in proper sanitary condition, and in case of occupancy as a dwelling-house, unless it shall be provided with suitable drains or sewers for conveying the sink-water away from the premises into some public sewer, if there be one within one hundred feet thereof, and if not, for conveying it away under ground or in some other way that will not be offensive.

SECT. 9. Any person neglecting or refusing to comply with the provisions of the preceding section shall be fined not exceeding ten dollars for each day of neglect or refusal, after notice as provided in section four of this chapter.

SECT. 10. No house of easement or privy, and no pen or sty for swine, shall be erected or continued in such place or condition as, in the judgment of the health officers, to be a nuisance or injurious to the public health.

SECT. 11. The health officers may in writing order the discontinu-

ance of any such nuisance; and may order that a privy located within one hundred feet of a public sewer shall be connected therewith. If any person shall continue the nuisance after such order from the health officers, or shall neglect to comply with an order made under the provisions of this section, he shall be fined not exceeding ten dollars for each day of such continuance or neglect.

SECT. 12. If a person shall place, leave, or cause to be placed or left, in or near a highway, street, alley, public place, or wharf, or shall allow to be exposed, unburied, any animal or other substance liable to become putrid or offensive, or injurious to the public health, he shall be fined not exceeding twenty dollars; and the health officers shall remove the same.

SECT. 13. If a person shall place, leave, or cause to be placed or left in or near a lake, pond, reservoir, or stream tributary thereto, from which the water supply for domestic purposes of a city, town, or village is taken, in whole or in part, any substance or fluid that may cause the water thereof to become impure or unfit for such purposes, he shall be fined not exceeding twenty dollars, or be imprisoned not exceeding thirty days, or both.

SECT. 14. The board of health of the town or the water commissioners having charge of the water supply, or the proprietors thereof, may remove such substance or fluid; and they may recover the expense of removal from the person who placed the same or caused it to be placed in or near the water as aforesaid, in an action on the case.

SECT. 15. If a person shall use or occupy a building or place near a dwelling-house or schoolhouse, or in the compact part of a town, for a slaughter-house, a place of deposit of green pelts or skins, or for trying tallow, currying leather, or carrying on any other business that is offensive to the public, without the written permission of the health officers of the town, he shall forfeit ten dollars for each month such building or place shall be so used or occupied, to be recovered for the use of the town.

SECT. 16. The health officers may withdraw the permission by notice in writing, whenever in their opinion such use or occupancy of a building or place becomes a nuisance. In such case they shall order the abatement of the nuisance and the discontinuance of the use or occupancy within a time limited. If the owner or occupant neglects to comply with the order, he shall forfeit five dollars for each day he so neglects or refuses after the expiration of the time limited, for the use of the town.

SECT. 17. Whenever any well, spring, or other water supply is suspected of being polluted by sewage or other matter dangerous to health, the health officers of the town where it is located may cause an analysis of its water to be made by a competent chemist, without expense to the owner. If the analysis shows the water to be unfit for drinking purposes, they may, with the approval of the state board of health, prohibit its use, and, if it be from a well, may cause the well to be closed. The state board of health shall authorize such investigations whenever deemed necessary for the public good.

SECT. 18. Whenever a building, tenement, or room occupied as a dwelling or schoolroom, or any cellar or other appurtenance connected therewith, has become the source of danger to the health of its occupants or others from want of cleanliness, the health officers may order the owner, his agents, or the occupants, or any of them, to cleanse and put the same in sanitary condition, and the occupants to quit the same, within a time limited. If the persons so ordered do not cleanse the same as ordered, the health officers may do so, and may recover the expense thereof, together with their fees, of the owner, or they may order the same to be closed and to remain so until properly cleansed. If any person shall fail to comply with an order of the health officers made under the authority of this section after receiving due notice thereof, he shall forfeit ten dollars for the use of the town, or be imprisoned not more than thirty days.

SECT. 19. Health officers of towns shall furnish the state board of health such information concerning their work as may be called for from time to time, and shall forward to the state board of health copies of all rules and regulations issued by them, immediately after the issue.

SECT. 20. They shall be paid by the town a reasonable compensation for their services, and all expenses incurred by them in the performance of their duty; and the selectmen are required to advance them such sums as may be necessary, of which and of all their receipts and disbursements they shall, before each annual town-meeting, render an account to the selectmen, to be laid before the town.

CHAPTER 108.

IMPROVEMENT OF LOW AND SWAMP LANDS FOR THE BENEFIT OF THE PUBLIC HEALTH.

SECTION 1. Selectmen, upon petition, may cause any low or swamp lands within their town to be drained or filled when the public health

or good requires it, and may lay out and take such land, easements, or rights in land as may be necessary for the purpose.

SECT. 2. The procedure and return in such case shall be the same as in case of the laying out of highways; and all parties whose interests are affected thereby shall have the same remedies as they would have if their land, easements, or rights had been taken in the laying out of a highway.

SECT. 3. In awarding damages to the owner of any land, easement, or right taken for such purpose, there shall be allowed, by way of set-off, the benefit, if any, to the property of the owner by reason of the improvement.

SECT. 4. The selectmen may assess upon persons whose lands receive special benefit from such improvements, their just share of all expenses incurred in making them.

SECT. 5. Such assessments shall have the same effect, may be abated or corrected, and shall be collected in the same way as in case of assessments for sidewalks and sewers.

CHAPTER 109.

SMALL-POX AND PESTILENTIAL DISEASES.

SECTION 1. The selectmen of a town, whenever in their opinion the health of the inhabitants of the town, by reason of the spreading of the small-pox, shall require it, may appoint an agent for vaccination, who shall be provided at all times with suitable matter for communicating the kine pox. He may vaccinate all persons at the expense of the town who have not had the small-pox or the kine pox, and shall receive a suitable compensation therefor, to be paid by the town.

SECT. 2. The health officers may remove any person infected with the small-pox, the malignant cholera, or other malignant pestilential disease, to some suitable house provided by them for that purpose, if it can be done without endangering the life of the person; and they may make such regulations respecting such house and for preventing unnecessary communication with such persons or their attendants as they may think proper. If any person shall willfully violate the regulations he shall forfeit fifty dollars, to be recovered by the health officers in the name of the town.

SECT. 3. It shall be the duty of every physician who attends upon any person infected with the small-pox, the malignant cholera, diphtheria, scarlet fever, or other malignant pestilential disease, immediately

to report the same to the health officers or to the selectmen of the town. If any physician shall neglect so to do, he shall forfeit the sum of one hundred dollars, to be recovered by the health officers or selectmen in the name of the town.

SECT. 4. If any person shall, with intent to communicate the small-pox, bring into this state or use any infectious matter, or shall inoculate himself or any other person with the small-pox, or be inoculated therefor, he shall incur a penalty of one hundred and fifty dollars, to be recovered by any person who will sue for the same, one half to his own use and the other half for the use of the town in which the offense is committed.

SECT. 5. If any person shall break out with the small-pox, and the health officers shall judge that he may remain without endangering others than his own family, they may give license to persons who have been exposed to the danger of taking the disease to be inoculated and to remain in the same house, subject to such regulations as they may impose.

SECT. 6. The sum of five thousand dollars is appropriated as an epidemic fund, to be used, if necessary, under the direction of the governor and council, in case of the invasion or threatened invasion of cholera or other epidemic disease in this state.

CHAPTER 112.

DISEASES OF DOMESTIC ANIMALS.

SECTION 1. The governor is authorized to accept on behalf of the state the rules and regulations prepared by the commissioner of agriculture under and in pursuance of section three of an act of congress approved May 29, 1884, entitled "An act for the establishment of a bureau of animal industry, to prevent the exportation of diseased cattle, and to provide means for the suppression and extirpation of pleuro-pneumonia and other contagious diseases among domestic animals," and to co-operate with the authorities of the United States in the enforcement of the provisions of such act.

SECT. 2. The inspectors of the bureau of animal industry of the United States shall have the right of inspection, quarantine, and condemnation of animals affected with any contagious, infectious, or communicable disease, or suspected of being so affected, or that have been exposed to any such disease; and for these purposes are authorized and empowered to enter upon any ground or premises. They shall have power to call on sheriffs, constables and peace officers

to assist them in the discharge of their duties in carrying out the provisions of said act of congress; and it is made the duty of said officers to assist them when so requested. The inspectors shall have the same powers and protection as peace officers while engaged in the discharge of their duties.

SECT. 3. All damages and expenses incurred under the preceding sections shall be paid by the United States, and in no case shall this state be liable for any part thereof.

SECT. 4. The secretary of the state board of agriculture, the master of the New Hampshire state grange of the patrons of husbandry and the secretary of the state board of health for the time being shall constitute a board, to be known as the state board of cattle commissioners. If a vacancy in the board shall occur, the governor, with the advice of the council, shall fill it by appointment, and the appointee shall hold office until the vacancy in the office occasioning the vacancy in the board is filled.

SECT. 5. The board shall make investigations in regard to the existence of contagious and infectious diseases among domestic animals within the state, and may make regulations prohibiting the introduction into the state of animals so diseased, and controlling or prohibiting their transportation, and such other regulations as the board deems necessary, to exclude or arrest any such disease, and may modify or amend its regulations as the circumstances may require.

SECT. 6. The board may employ skilled veterinarians and agents and servants to aid in the performance of the duties assigned to the board.

SECT. 7. Any person or corporation who shall violate any of the regulations of the board shall be fined not exceeding one hundred dollars.

SECT. 8. The compensation and expenses of the board shall be audited and fixed by the governor and council, and shall be paid from the state treasury, but all expenses incurred under the provisions of this chapter shall not exceed ten thousand dollars in any one year.

SECT. 9. Selectmen shall cause all horses infected with glanders or other contagious disease, and all other domestic animals infected with contagious diseases, or which have been exposed to such diseases, to be collected in some suitable place or places and kept isolated from other animals so long as may be necessary to prevent the spread of the diseases.

SECT. 10. In the performance of the duties prescribed by the preceding section the selectmen shall be governed by the regulations and

directions that may be made or given on the subject by the state board of cattle commissioners.

SECT. 11. The state board of cattle commissioners, or if they have not taken cognizance of the case, the selectmen of the town in which the animal is, may order any domestic animal killed and buried which in the opinion of a veterinary surgeon, selected by them, has a contagious or infectious disease.

SECT. 12. The owners of animals so killed shall be entitled to recover of the town the value of such animals in their diseased condition, if they had been owned in the state three months at least before the disease was detected. The state board of cattle commissioners or the selectmen, as the case may be, shall cause the value to be ascertained by the appraisal of three competent and disinterested persons selected by them, who shall be sworn to the faithful discharge of their duties.

SECT. 13. In case the owner is aggrieved by the appraisal, he may appeal by petition to the supreme court within thirty days after he is notified of the appraisal. He shall notify the town of his appeal, and enter and prosecute it, as he would if it were a civil action at law, wherein the same amount of damages was claimed; and judgment shall be rendered therein in like manner.

SECT. 14. If, upon such appeal, he recovers a larger sum than the appraisers awarded him, he shall recover his taxable costs; otherwise he shall pay costs.

SECT. 15. All damages and expenses incurred under the preceding sections, except expenses incurred by the state board of cattle commissioners shall be paid by the town in the first instance; but four fifths thereof shall be reimbursed to it from the state treasury. The governor and council shall audit all claims thus presented, and the governor shall draw his warrants upon the treasurer for the amounts allowed, in favor of the towns entitled thereto.

SECT. 16. In cases where United States inspectors, state commissioners, and selectmen, or any two of such boards, take action with reference to the same subject-matter under the provisions of this chapter, they shall have precedence in authority in the order above named.

SECT. 17. Any person or corporation who shall bring into the state, between the twentieth day of May and the twentieth day of October, any Texas or Cherokee cattle that have not been kept north of the Ohio or Missouri river during the winter immediately preceding, shall be fined not exceeding twenty-five dollars for each animal so brought into the state. The term Texas or Cherokee cattle shall be con-

strued to mean the native cattle of Texas and Louisiana and the classes of cattle known under those names.

SECT. 18. Any person who shall expose or suffer to be exposed, in any highway, public place, or pasture any horse affected by the disease known as glanders, shall be fined not exceeding fifty dollars for each offense, for the benefit of the town or city where the offense is committed.

SECT. 19. Any person exposing any domestic animal as aforesaid, affected with any other contagious or troublesome disease, shall be fined not exceeding twenty-five dollars for each offense, for the benefit of the town.

SECT. 20. It shall be the duty of selectmen and police officers of towns in which any of the offenses mentioned in the three preceding sections shall be committed, to cause the offenders to be prosecuted.

CHLORINATED LIME AS A HOUSEHOLD DISINFECTANT.

BY JOHN J. BERRY, M. D., MEMBER OF THE STATE BOARD
OF HEALTH, PORTSMOUTH, N. H.

No problem of greater importance confronts us from day to day than the effective disinfection of the sick room. Not because of the want of proper agents, but rather by reason of their great number and the confusion existing in the minds of many regarding their application. It is not surprising that such should be the case, for the fact is generally admitted that the germs of infectious diseases are of a most varied character, each possessing its own characteristics as regards development, propagation, and tenacity of life. Hence, an agent which readily attacks and promptly destroys the germ of one disease may prove wholly inefficient in reaching and removing that of another. To the physician or trained nurse the attainment of the desired results is a matter of little difficulty, but to the large class of people among which the various infectious diseases are specially prevalent and fatal, the details of practical disinfection form an unlearned science. It is, indeed, this lack of definite knowledge which has proven the most serious obstacle in the path of sanitary advancement.

It will be readily admitted that the intelligent use of a single disinfectant is productive of far better results than the careless and indifferent use of two or three simultaneously; in fact, the attempt to apply a special germicide to each particular case has in most instances proven a decided failure.

In view of these facts, it has seemed to us that some single agent which is cheap, harmless, effective, and readily applied, might be recommended almost exclusively — its proper employment being thoroughly explained and insisted upon.

Chlorinated lime probably possesses these qualifications to a greater degree than any other disinfectant and germicide, hence should be, in our opinion, the one generally advocated. This substance, commonly known as "Chloride of Lime" or "Bleaching Powder," is a white, dry powder, having a saline taste and a slight odor. It contains from 20 to 30 per cent of free chlorine to which its active properties are due. For this reason it is a somewhat unstable compound, being readily decomposed and setting free its chlorine in the presence of moisture, carbonic acid, the carbon dioxide of the air, and all organic material with which it may come in contact; hence, its action is more prompt than that of any other disinfectant. Its trifling cost, which is not over five cents a pound and even less in larger quantities, is another advantage, permitting its free and prolonged use by those unable to procure the more expensive and perhaps less effective agents.

This substance exerts a powerful action, not only as a disinfectant and deodorizer but also as a germicide. In a series of experiments conducted by the "Committee on Disinfectants," of the American Public Health Association, its properties were thoroughly investigated and these several characteristics fully demonstrated. It was shown that a solution of chlorine containing one part of the hypochlorite to 400 of water, was an effective germicide, even when allowed to act only one or two minutes. One of six parts to 10,000 was found to kill in two hours the spores of the bacillus anthracis, a disease germ most virulent in its action and most difficult to destroy. A similar result was attained by careful experimentation regard-

ing its power to disinfect fecal matter. For these reasons, we may be fully assured of its efficacy in typhoid fever, diphtheria, and the ordinary contagious diseases, when employed in proper proportions. A like action may be noted whenever an infected atmosphere is treated by the same agent. In the presence of moisture, dry anthrax spores are killed by exposure for one hour to air containing 4 per cent of chlorine, while vaccine lymph loses its infectious properties in the presence of a one per cent vapor of the same. Hence, chlorinated lime has been recommended by the latest authorities as being, in a large proportion of cases, the best disinfectant known.

PRACTICAL APPLICATIONS.

Chlorinated lime may be used in its dry state or, better still, in solution. The latter can be prepared by dissolving six ounces of the powder in a gallon of soft water, forming what may be termed the "standard solution." This should be kept in clean air-tight receptacles until used.

There is probably no better method of treating infected clothing than by exposing the same to steam or other form of intense heat. Hence, all such material should first be boiled continuously for an hour. This promptly destroys all disease germs and their spores and thus removes all danger from these sources. While there are a few of these organisms which resist for a few minutes a temperature of 212 F., the great majority succumb to a degree of heat not exceeding 140 F. It should be remembered, however, that large and compact bundles of clothing placed in the boiler, are not equally disinfected; for while the temperature of the external portions may be sufficiently high, that of the centre may be scarcely up to the boiling point. Should it be impossible to carry out this plan at once, the infected material may be placed in the standard solution, diluted with three or four parts of water, or else gathered into one mass and enveloped in a covering saturated with the same. The use of the solution should follow rather than precede the process of boiling, for, by having the clothing comparatively clean and free from organic matter, a

weaker solution and a less prolonged application of the same is required. The use of this agent has been frequently objected to on account of its bleaching action upon woollens, colored goods, and those of delicate texture. Material such as these, however, should be used as little as possible in the sick room, but if used, should be disinfected by heat alone; whereas, upon ordinary white goods a solution of the strength demanded can have little if any destructive action. The above methods are usually supplemented by the process of ironing, which, on account of the steam developed, is in itself of some germicidal value.

In many, if not all the infectious diseases, the waste products eliminated by the lungs, kidneys, bowels, skin, and mucous membranes possess poisonous properties which contaminate everything with which they come in contact and may, either immediately or at some future time, reproduce themselves. It is important therefore, that they should be at once deprived of these elements of danger. Nothing will accomplish this result better than chlorinated lime, which for rapidity of action so much exceeds all other agents. The dejections of patients suffering from infectious diseases, especially typhoid fever, should be treated for an hour with the standard solution, from 2 to 3 quarts being used for each evacuation. As its active principle, the hypochlorite, is quickly decomposed in the presence of all organic matter, it should always be present in excess of the amount of material to be disinfected. As regards large amounts of excreta, as for example, the contents of vaults and cesspools, there is no method by which they can be thoroughly sterilized. The belief that the poisonous elements of such collections may be destroyed by any powerful agent applied to their surfaces, is both a false and dangerous one. Certain ones have greater powers of penetration than others but no substance can exercise such action unless brought into direct contact with the objectionable material. When this can be accomplished, about one pound of lime powder will properly disinfect about 30 pounds of solids. This may be applied in solution or sprinkled thickly over the surface to be

purified. The secretions of the nose and throat, which in diphtheria are extremely poisonous, should be received into vessels containing the freshly made solution, or upon cloths or handkerchiefs which should be promptly destroyed. A gargle of the same, diluted with four or five parts of water may also be used frequently as a precautionary measure.

The skin, which in scarlet fever particularly, and in many other affections to a less degree, is a frequent source of infection, should receive no less attention. A lotion of the same strength, to which Listerine, cologne, Florida water or other toilet preparation has been added, forms an effective as well as agreeable application which may be used freely in all febrile conditions without injury to the skin. When desquamation of the cuticle occurs, as in scarlet fever, the use of the above should be supplemented by the inunction of oil.

The latest and best appliances for sewage disposal will at times prove sources of danger unless subjected to careful and intelligent supervision. However thorough the removal of such material may be, the traps and pipes become after a time, foul and offensive and perhaps clogged with organic matter. The first step in the process of cleansing is the preparation of a hot saturated solution of washing soda or, better still, caustic soda, which should be poured down the pipes in sufficient quantity to about fill the traps. The alkali, if allowed to remain for several hours, unites with the greasy deposit and forms a soap which is readily washed out by the free use of hot water. The subsequent employment of the standard solution in sufficient quantities renders the disinfection complete.

Sewers and drains which are constructed of wood and are otherwise faulty, cannot be thoroughly purified, yet their frequent flushing and the use of the solution in generous quantities affords the best plan we know of for keeping them in the best condition possible. The facility with which this agent decomposes the sulphuretted hydrogen compounds and other gaseous bodies, renders it equally valuable as a deodorizer in this as well as all other cases where several indications are to be met.

Neither this nor any other agent can be relied upon solely for the disinfection of the sick room. Fresh air and cleanliness rank highest as purifying agents; all others are merely adjuvants. We can accomplish far more by diluting and changing the atmosphere of an infected room, than by trying to destroy its germs by some disinfecting substance; in fact, the latter alternative must necessarily prove futile, for the air of any enclosed space impregnated with such an agent in sufficient quantities to prove germicidal, would become at once uninhabitable. Yet a small quantity of the solution exposed to the air by means of three or four towels dipped in the same, acts as a prompt and effective deodorant, if nothing more.

While then no apartment in constant use can be completely disinfected, much can be done in this direction by a frequent washing of the floor, paint, woodwork, and furniture with a diluted solution of the lime, one part to three being a proper proportion. This, together with the other methods above advocated, will maintain any living room in about as perfect a condition as it is possible to secure.

While there are other agents, such as carbolic acid, corrosive sublimate and permanganate of potash, which in certain cases are superior to chlorinated lime, we believe there are none which for general utility, can be compared with it.

Chief among its virtues may be noted the following:

1. Moderate cost.
2. Facility of application.
3. Rapid action.
4. Decided germicidal powers.
5. Marked deodorant properties.
6. Non-poisonous qualities.
7. General adaptability.

OUR COMMON SCHOOLS.

BY D. M. CURRIER, M. D., NEWPORT, N. H.

It has been said that "the crowning glory of our civilization is our common schools," and for this reason we should never tire of doing our utmost to promote their usefulness.

In the effort to improve the social, moral, or religious well being of a people, reformists at the present time recognize in the plastic minds of childhood and youth their best field of operation.

Temperance reformers have been working away on their much hackneyed subject for a century. For a long time not a passing thought was given to those millions who were pressing on to take the place of the fallen. In due time, however, the strength of the gigantic evil was discovered; and now, those organizations are endeavoring to starve it into inaction by temperance instruction to the young, and by securing laws in most of the States requiring such instruction to be given in the common schools. In our efforts as sanitarians to improve the physical well being of the State, we may well copy after the reformist.

Our efforts receive more or less opposition from lack of intelligence on the subject among the common people. "How best to educate the people in public hygiene is the most important question in relation to public health." Much has been done in the last few years by state and local boards of health to disseminate sanitary knowledge among the people, and where they have fully understood the importance of a change they have been willing workers to that end.

We are living, however, for the future generation. The question we may well ask ourselves is, how can we make that generation better, wiser, and more vigorous than ourselves. To accomplish this we should not build too much from the top, but start from the beginning and build from the foundation.

The pupils in our common schools should be brought daily

in contact with the practical application of sanitary law. The principles on which they work and their operation should be fully explained to them and their importance impressed on their minds. When he sees these principles carried out and enforced in the daily discipline of the school, they will influence his after life, and we shall see his own private dwelling constructed according to the laws of health and his private and social life be under the same rule of action.

This cannot be done without systematic sanitary supervision of our schools, and teachers capable of teaching the principles of public hygiene. There is a law on our statute books requiring this along certain lines, but many complain that it is inoperative from the lack of efficiency of the teacher in this respect. To obviate this difficulty normal schools should make it a part of their curriculum.

Teachers admitted to public confidence, as instructors of the young, should be examined and found qualified to teach the principles of sanitation before admitted to their task. When they have that enthusiasm which comes from a knowledge of the subject there will be no complaint about their not imparting it to those under their charge.

When this is done the foundation will be laid for the popular observance of those laws that govern the health of the community and through that secure their material prosperity.

If for no other reason, teachers for their own selfish interest should be good sanitarians. I think it is a well recognized fact among physicians in this country that the teachers in our common schools are more liable to fail in health than those of a similar age in other occupations. A little better understanding of school hygiene on their part would save many a valuable life and keep many more efficient workers at their task.

H. P. Yeomans in a paper before the American Public Health Association says: "The method of instructing teachers in training at normal and model schools and the sanitary supervision or systematic inspection of schools are both worthy of consideration. Without suitable hygienic

instruction of teachers preparing for professional work and systematic sanitary supervision of schools we cannot expect to accomplish much in establishing thorough, practical, and uniform instruction in school hygiene."

The contrast between the sanitary care which the State gives its convicts and that given to the common school is very marked. In our state prisons there are incarcerated about 110 convicts. They are put there by the authority of the State. They are composed of the very worst element that the State affords. Many are past reform. Their lives are of no use to themselves or to their friends, and of no value to the State.

The State practically says of these convicts "You are a menace to my life. Your presence among us in all the functions of a free born citizen is dangerous to my well-being and handicaps my prosperity, therefore for my own safety we confine you here." But does the State in doing this leave them uncared for? By no means. Men of known integrity and ability are appointed to preside over them. Their physical condition and health are abundantly cared for, from the fact that some of the best medical men in the State are appointed to look after their welfare in this respect.

The prison physician is required to visit regularly the institution, to see that every possible thing is done for the health and comfort of the inmate as far as compatible with the fulfillment of the law in their sentence.

In the common schools of the State we have 35,659 pupils between the ages of eight and fourteen, who are put there by the same authority that confines the convicts to their penal abode.

It says to these children of tender age, "You must serve a term of at least 420 days before you are fifteen years of age in the common schoolhouses of the land."

The State at this point chooses to end its responsibility. No inquiry is made into the physical condition and needs of those they have thus incarcerated.

No medical supervision whatever is required to see if their

confinement is working them bodily harm. Thirty-five thousand six hundred and fifty-eight of the best part of our population, those upon whom the hope of the State is placed and the destiny of its future depends; those of that tender age when external influence and unsanitary surroundings will have the most damaging and lasting effect, are left without that medical care which is given to the outcasts of society in our state prisons.

It may be asked, "What can be accomplished by medical or sanitary supervision of schools?" The appointment of a local school physician who should supervise a certain assigned district, containing not more than 1,000 pupils, and have consultative and deliberative functions with the teacher, would do much towards guarding both the pupil and teacher against those evils which under the present arrangement are liable to assault them. The general sanitary condition of school life and schoolhouse with all its surroundings should receive his attention. He should secure the best known methods of ventilating, lighting, seating, and construction of schoolhouses in his district. He should at proper intervals test the air of the schoolrooms during its sessions, to be sure that the amount of carbonic dioxide does not increase to an extent detrimental to health. If the amount was large it would lead to the inquiry if the system of ventilation was in working order, and any defect that may have occurred remedied.

Pupils should be measured twice per year and placed at desks conforming to their height. All contagious diseases that appear in the school should be at once reported to him, thereby securing proper means to prevent its spread, and no child having had a contagious disease should be allowed to again attend school without his permission.

Perhaps no single organ is more liable to suffer in school life than the eye. How often do we hear of cases of alleged stupidity of scholars in our common schools, in boys and girls who otherwise are bright and active, but who fail to comprehend the simple lesson on the blackboard by reason of near-

sightedness. Others appear to receive the severe chastisement of the teacher rather than to apply themselves to books, on account of the severe strain and pain it causes in the eye from want of proper innervations. These troubles with the eye may be caused by insufficient or badly arranged light and poor ventilation.*

This condition may go on until a permanent defect is established and the average teacher never know or even suspect the real cause of the trouble.

How many bright intellects have marked out for themselves brilliant spheres of usefulness, but who have been obliged to abandon all their cherished hopes for the future by reason of a gradually increasing defect in their sight, which they first noticed in their common school days. It should be the duty of the school physician to regularly test the sight of the pupils in his district as often as every six months, make a record of the condition of each, and then by comparing one record with another the very commencement of any defect could be readily detected and the proper treatment applied.

The filthy condition of out-buildings to our common schools are proverbially bad. It is one of the moral blights upon school life. It is hard for the teacher alone to remedy. The aid given by sanitary inspection in this respect would no doubt be welcomed by them.

At the close of the school year the physician in charge should be required to report his work and observations made, to the State Board of Health, who would compile the various reports for publication and no doubt there would be many valuable suggestions derived from them which would add greatly to the cause of sanitation in our State.

It may be objected that the cost of thus giving sanitary supervision to our schools will be greater than the community would be willing to bear. Let me ask is it not cheaper to place buoys and light over the hidden reef than to repair the damage done as vessel after vessel is dashed to pieces. It

* In a former paper on the "Sanitary Conditions of School Life," vol. 7, it was shown that badly ventilated schoolrooms were a direct cause of myopia.

would be placing the physician in his truer and nobler position, that of a guardian of the public health and the prevention of sickness rather than curing it.

As the proper ventilation of our schoolhouses is of prime importance I wish to supplement these rambling and much interrupted thoughts by a few words on the subject.

In the report of the State Board of Health for the year 1888, Vol. VII, I explained a system of heating and ventilation which has been very effective and given good satisfaction where it has been used. It was introduced into several of our village schools in 1887. The system consists briefly of a jacketed stove with an inlet duct coming from outside and opening upward through the floor under the stove.

An outgoing duct was constructed on the opposite side of the room from the stove, extending up through the top of the building, with an opening on a level with the floor. We find this arrangement equalizes the temperature of the room to a remarkable degree, as indicated by the following observations taken October 28, 1891. The temperature outside was 31 degrees F. At 10 o'clock A. M. visited our south primary school, which was in session. In this schoolroom the jacketed stove has been in use for four years. The stove was on the south side of the room near the teacher's desk. The outgoing flue was on the north side, directly opposite. Four thermometers were placed on the four sides of the room about equal distances from the corners and a little higher than the pupils desks. After remaining thirty minutes they registered as follows:

South side	.	.	.	.	.	62 degrees.
East side	.	.	.	.	.	60 "
North side	.	.	.	.	.	60 "
West side	.	.	.	.	.	61 "

The room seemed a little cool but no one appeared to be suffering from the low temperature. The fire in the stove was very low.

Went immediately from this school to the east primary, and at 11 A. M. made the same observations as at the south primary. In this room they were not using the jacketed

stove nor any special arrangement for ventilation. In other respects the stoves in the two rooms were alike. The size and seating capacity were less than in former instances. The stove and teacher's desk were also on the south side of the room. In thirty minutes after being placed in position the thermometer registered as follows:

South side	.	.	.	.	.	74 degrees.
East side	.	.	.	.	.	61 "
North side	.	.	.	.	.	65 "
West side	.	.	.	.	.	65 "

A difference of 13 degrees in the smaller room without the improved heating and ventilating facilities and a difference of only 2 degrees with them. This arrangement furnishes an abundant supply of fresh air at any desired temperature, and at all times under control without leaving the room. It does not necessitate any material change in the appearance of the schoolroom as shown by Fig. 1.

Soon after this system of heating and ventilation was put in, the teachers remarked to me that previous to its use the windows during the cold days in winter would become thickly covered with frost, showing a high degree of humidity in the atmosphere of the room owing to the exhalations from the lungs and bodies of the pupils. After the present arrangement had been put in, the glass in the windows remained clear at all times, and the room was free from that musty schoolhouse odor which is so frequently noticed in badly ventilated houses.

In Massachusetts this system of heating and ventilating is being quite rapidly introduced, from the fact that "the present requirements of the Massachusetts state board of inspection make it imperative for school authorities to provide some proper means for heating and ventilating the buildings under their charge."

Its recommendations are the effectiveness of the system, its cheapness, and adaptability to all schoolhouses heated with a stove, and where furnaces are not practicable.

They are using quite largely what is called the Puritan Jacketed Stove, manufactured by the Barstow Stove Company.

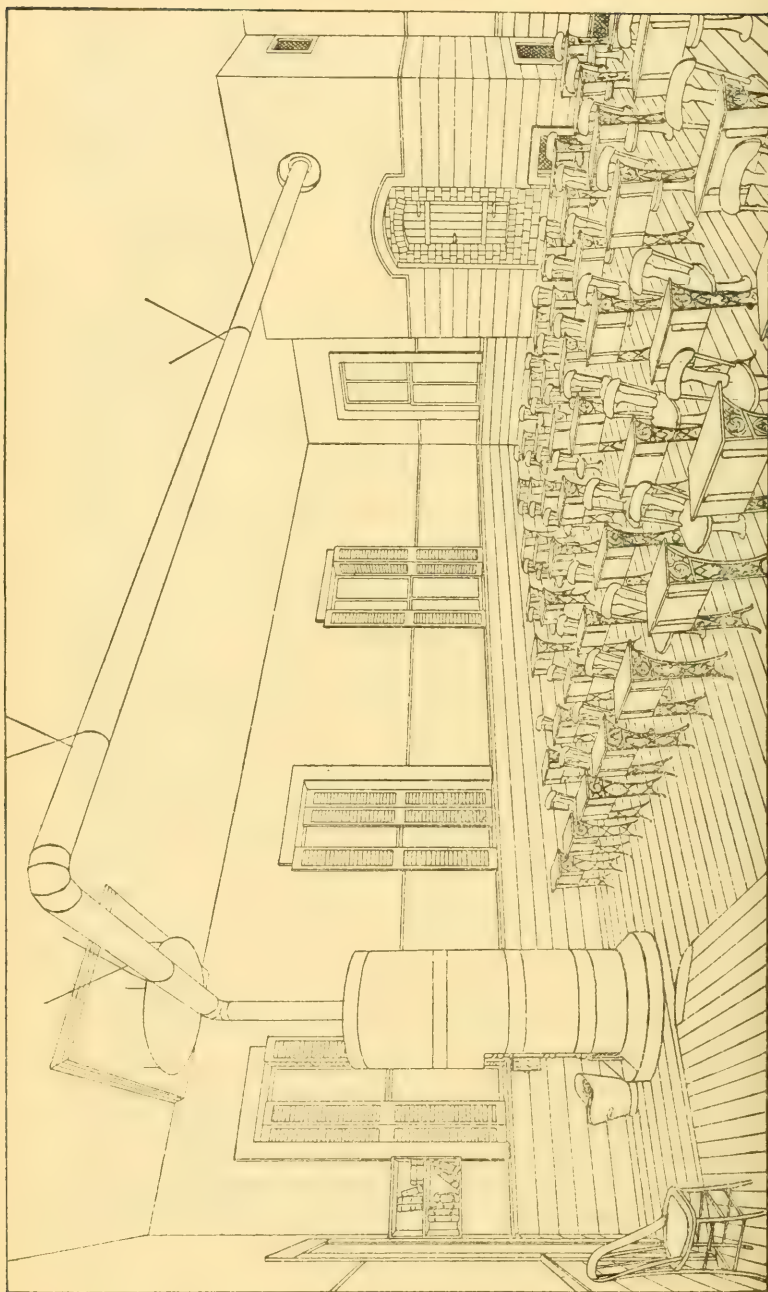


FIG. 1.

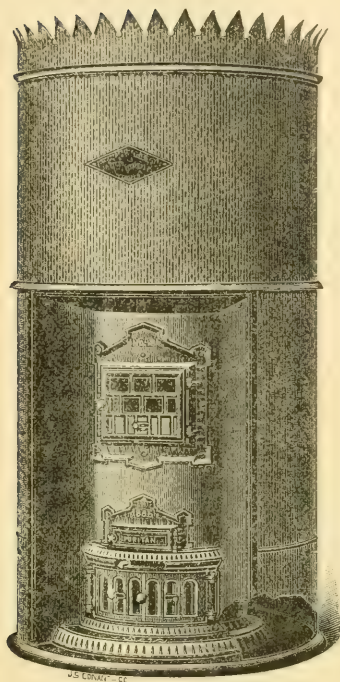


FIG. 2.

These stoves shown in Fig. 2 “are eighteen inches in diameter and are surrounded by a jacket made of No. 24 crimped, galvanized iron thirty-six and a half inches in diameter, thus having a space of about nine inches around the stove except at the door, where a suitable recess makes tight joints. This jacket is connected by an opening 12 x 20 inches which comes from outside of the building, the inlet in lower stories being four or five feet from the ground and covered with a netting.”

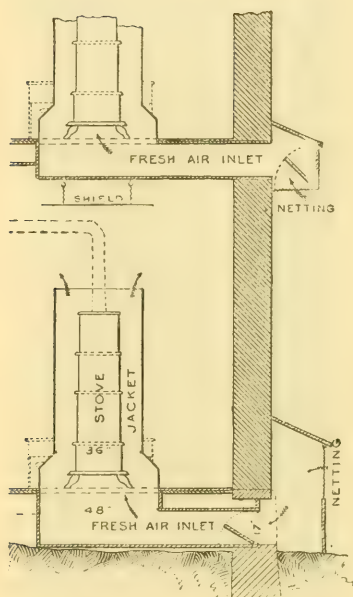


FIG. 3.

The suggestion is made to have the incoming duct open from both sides of the house and provided with proper dampers, thus affording an opportunity to obtain a supply of air from the windward side of the building, and to regulate the amount of air supplied to the jacket around the stove.

To facilitate the passage of impure air from the room, the company provides a heated flue as represented by Fig. 4.

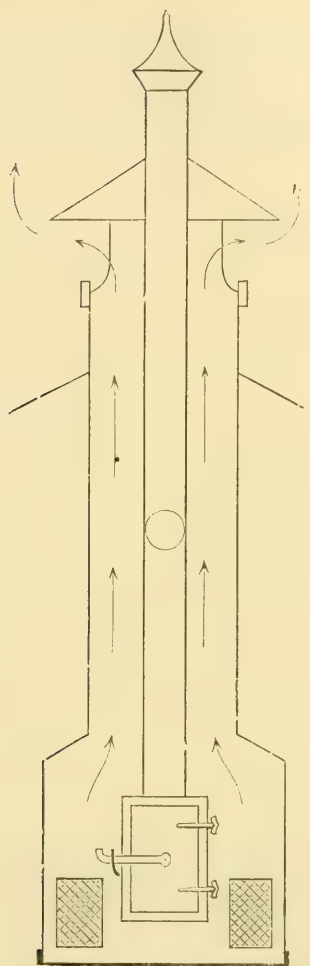


FIG. 4.

This is made of corrugated galvanized iron with a stove inside. They claim it is cheaper than a brick shaft, but there is a constant expense to run an extra stove.

I think a draft could be created in the outgoing flue in a

different way and with no additional expense above first cost. Build a shaft large and from the ground, with an opening on a level with the floor. I would then have the smoke flue from the stove pass into this and continue through its centre to the top, depending upon the heat it produces to cause a draft.

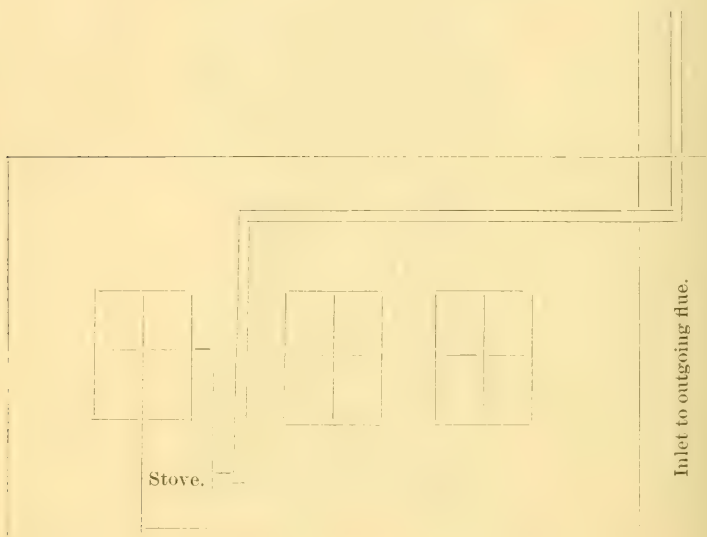


FIG. 5.

Nothing new is claimed by this system of heating and ventilating our common schoolhouses, but it has proved itself so admirably adapted to the demands, equally heating the whole room and removing the impure air, without the danger and discomfort of cold drafts from open doors or windows, we wish it would be more generally adopted.

We believe the interest of the common schools of America should be continually in the minds of the whole people, that no expense or care is too great to make them as they have already been called, "the divinest thing on earth."

THE SEWERAGE OF TWO NEW HAMPSHIRE TOWNS.

BY GEO. E. WARING, JR., M. INST., C. E., NEWPORT, R. I.

It may be of interest to the readers of the report of the Board of Health in New Hampshire to be informed as to the sewerage of Keene and of Laconia, works which have been carried out on a system materially different from what had before been used in this State; this being the same system that was introduced in the city of Memphis, Tennessee, after the yellow fever epidemic of 1878-9.

It is a peculiarity of this system that it is used for the removal of foul sewage only, no rain water being admitted either from the surface of the ground or from the roofs of houses. The sizes of the sewer pipes are proportioned to the limited but uniform work of removing the daily foul waste of houses and manufacturing establishments. The lateral sewers, constituting a very large proportion of the system, are only six inches in diameter. When enough building lots have been passed to make the future maximum flow of sewage sufficient to fill a sewer one half full, its size is increased to eight inches, which about doubles the capacity on moderate grades. When the eight-inch sewer would run as much as half full, an increase is made to ten inches, of which the capacity is about 60 per cent more than that of the eight-inch. As no rain water is admitted for the flushing of the sewers, it becomes necessary to substitute other means for keeping them clean. This is done by placing at the head of each sewer, below the surface of the street, a small cistern, called a flush-tank, and holding, when full to the level of its discharging point, about 150 gallons of clean water admitted from the water supply in a very small dribbling stream, sufficient to fill it about once in twenty-four hours. When it becomes filled, an automatic siphon is brought into operation, discharging the whole volume suddenly in a strong flushing

stream, flowing freely down the sewer and carrying with it all matter stranded by the normal flow, which, toward the upper end of each line, is not sufficient for the removal of all solids. In addition to its effect in cleansing the sewers, this discharge from the flushtank drives along the air contained above the flow in the sewer, forcing it out at the different ventilators as these are approached, and drawing in air through the ventilators which it has passed. The ventilators of the whole system are the house drains and soil pipes of all the houses connected, there being no trap between the sewer and the open mouth of the soil pipe above the houses. This ensures a free and copious ventilation of the sewers at all times; not only during the flushing from the tanks, but from a constant interchange of current between different soil pipes, influenced by the wind, by changes of temperature, by the discharge of fixtures in houses, etc. If properly cared for in the matter of obstructions, and if regularly flushed as above described, these sewers with their house drains and soil pipes are so constantly and freely ventilated that the accumulation of the gaseous products of decomposition is impossible. What is known as "sewer gas" cannot exist in such a system of drainage, if the most ordinary care is taken to prevent deposits of organic matter therein. The general principles under which the system is constructed are substantially the same as those used in other sewerage work. Manholes, inspection holes, facilities for cleaning, etc. being measurably the same.

The system has three preponderating advantages: (*a*) Its cost is, on the average, not more than two fifths of that of a system arranged to remove surface water and house drainage together. (*b*) As it does not depend on the occasional, and frequently lacking, flushing by rain, nor on precarious and costly flushing by hand, but is, on the contrary, thoroughly washed out by automatic process every day, the accumulation of deposits, at least unperceived and neglected accumulations, cannot occur. It is one great advantage of this system that if a deposit forms which the flushtank cannot remove, it is pretty sure to make itself known by a complete stoppage of



the sewer and to demand the removal of the obstructing material; while in systems with large pipes, there is ample room for the accumulation of an offensive and dangerous amount of organic deposit with ample water way above or around it. Such sewers may go for a long time without cleaning, simply because they will perform their main office of carrying away sewage without being cleaned. (c) The ventilation of the system is much more complete than it would be possible to secure with the use of the larger pipes of the combined system. (d) There is no opening between the sewers and the surface of the street through which offensive odors can escape to the annoyance of the people, nor are there the filthy and objectionable catch basins by which it is attempted, not always successfully, to hold back street dirt, and which often become very offensive by decomposition during the intervals between storms. These serious drawbacks are entirely eliminated.

In most towns of moderate size there is no occasion for the universal removal of surface water through underground channels. It is often, and indeed generally, necessary to carry street wash from points where it accumulates to a dangerous or inconvenient extent. Channels for this purpose may either be independent, shallow, and often short lines, leading to a near point of outfall; or, if the outfall of the foul system is sufficiently near at hand, its main sewer may, from the desired point, be sufficiently increased in size to take the surface water as well. Whether or not, and to what extent, this should be done, is a question, the decision of which calls for the judgment and experience of a competent engineer.

KEENE.

A movement was made for the sewage of Keene about 1876, when it was proposed to construct a combined system of sewers, varying in size from pipes twelve inches in diameter to brick sewers forty inches wide and sixty inches high. The cost of this work would have been so large that nothing was done toward its execution. The question was taken up again after 1880, when the success of the work at Memphis

had become known, and, as a result, the work of construction was begun in 1882 and was substantially completed in the following year, the total length of sewer constructed being a little more than eleven and one half miles, all of pipes ranging in size from six inches in diameter to fifteen inches in diameter. The six-inch pipes constitute about 73 per cent of the whole. The system then included forty-four automatic flush-tanks and fifty-one manholes. The total amount paid for the work under the contract was about \$84,000.

There have been almost yearly extensions of the system, which at the end of 1890 comprised about thirteen and one half miles of sewers with fifty-two flush-tanks, fifty-one manholes, and three outlets into the Ashuelot river. The two principal outlets, discharging the sewage of nearly the whole city, are fifteen inches in diameter. There has never been any offense or difficulty connected with these outlets.

The Ashuelot is subject to high floods. The outlet of the central main sewer is sometimes submerged to a depth of six or eight feet, and much of the flat area through which the Beaver brook main runs is under water, in some cases over the tops of the manholes. These conditions indicated that it would probably be necessary to make use of jet pumps near the outlets of these lines, to maintain a flow during high stages of the river. It was found, however, that during the spring flood of 1884, which was unusually high, the natural flow of the sewers maintained a constant current through the whole system. No inconvenience was caused by the failure of the house drains, even in the lower portions of the town, to discharge freely and it was thought unnecessary to carry out this part of the plan at present. The indications now (1891) are, that such an aid may be required at the outlet of the central main.

The sewerage of Keene was not carried out without the opposition that is so often raised, by certain classes of the community, to all public improvements calling for taxation. Indeed, the opposition was at one time very serious. It was, however, overcome by the persistent energy of those who had

inaugurated the enterprise. After the system had been in operation for more than a year, Dr. George B. Twitchell, to whom more than to any one else the credit of the completion of the undertaking is due, wrote: "The system has been now, after a year's trial, found to work well, and to give complete satisfaction, and the people are constantly making connection with it. The croakers have ceased to find fault, and petitions are now before the city government for extensions into certain streets. The system is working better than its most sanguine friends ever dared to hope."

Mayor Kimball wrote at the same time: "It seems to me that the construction of our sewers is as nearly perfect as can be. From the fact that no impediment to a steady flow has been discovered from the beginning, and I have not heard that any one of the forty-four flushtanks has failed at any time to perform its duty with accuracy. In brief, I think if a vote were to be taken now, a large majority of our citizens would say that our sewerage system, and the manner of its construction, meet with their full approval."

Mr. P. F. Babbidge, the superintendent of water-works and sewers, who has been in charge of both construction and maintenance for some years past, writes: "The whole system here is working like a clock." He gives the entire cost of maintenance, including \$400 of his own salary, the compensation of the inspector of plumbing, all repairs, inspection tools, and everything else chargeable to the account of maintenance in the last fiscal year as \$828.53.

He says of the West and School street main, of which the length is about 3,000 feet of six-inch pipe with a grade of 1 to 400, and flushed by two tanks: "There are forty-five connections with this line, all large houses. I have to run a ball through this line twice a year to remove the sludge as it has such a slight fall; but have not had a stoppage in it since the first summer I was here (1888), when, in fact, all the lines were more or less clogged." Concerning this clogging, he says, "I find that considerable sand gets into the pipes when connections are made, especially when a Y has to be

cut in. I am also troubled a little with roots, and everything that is made by man gets into the sewers — dish rags, bones, spoons, old aprons, skirts, newspapers, etc. I could fill a page with the different things I have found in the pipes. The balls locate partial stoppages and so prevent a full stop.”

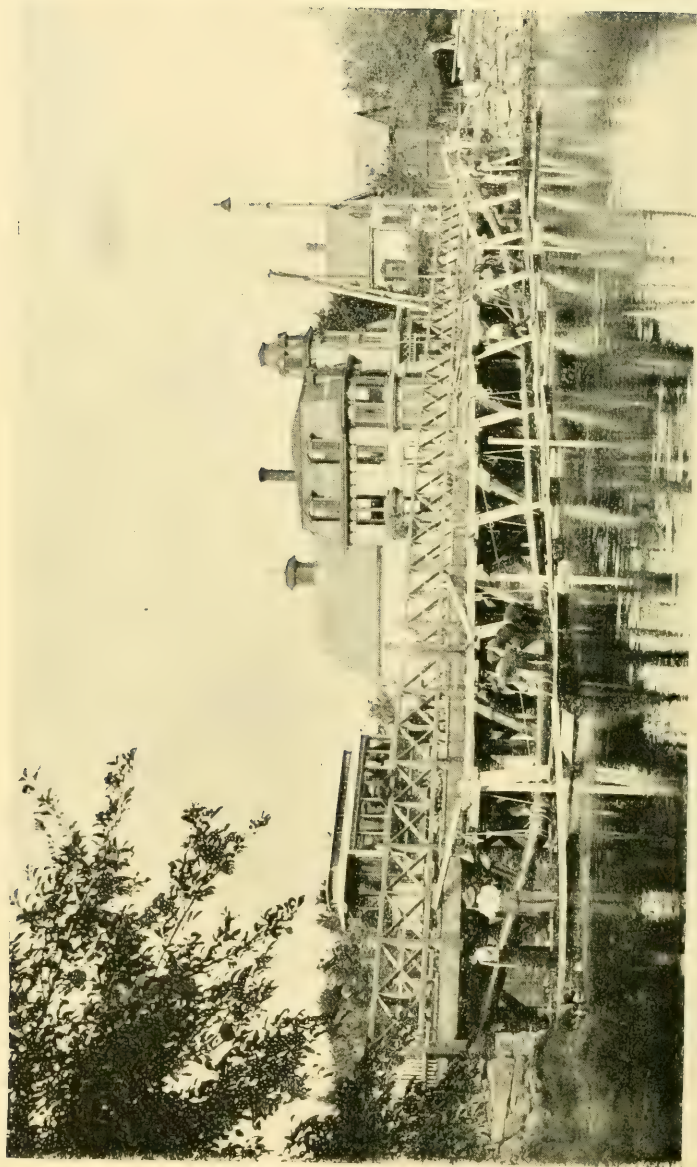
There are now, in Keene, about 800 families whose premises are connected with the sewers.

LACONIA.

The writer also made a plan for the sewerage of Laconia in 1886. The conditions here were much more difficult than they were in Keene, where the chief obstacle to satisfactory working lay in the quicksand, of which a good deal was encountered, much of the city being low and flat.

Laconia lies on both sides of the Winnepesaukee river, a stream of great volume, with a mill dam in the heart of the town, making a deep channel above with an exceedingly rapid current below, the discharge into Sanbornton bay being within the town limits. The conformation of the territory is such that it was not possible to carry all of the drainage from the area east of the river to the outlet on that side, a very considerable portion of it had, necessarily, to be carried across the river to be delivered by the main sewer of the west side. A pipe might have been suspended under the bridge crossing the river at Church street, which would have resisted the flow of the stream, that point being above the dam, but it could not have withstood the rush of logs liable at any time to be brought against it. This difficulty was overcome by making an inverted siphon of iron pipe, descending to the bottom of the river and embedded in it, and rising at the outgoing side to the level of the sewer into which it is to discharge. As this pipe will always be full and will consequently have but a sluggish current, provision has been made for keeping it clear by placing a large automatic flushtank (capacity 1,600 gals.) near the corner of River street and Arch street, in the line of the Arch street sewer. There is sufficient fall to the ground here to allow a drop in the grade





LAYING THE SIPHON AT THE CHURCH STREET BRIDGE.

of 5.6 feet. The flushtank is placed at this point, receiving the entire flow from the sewer above, retaining it until full, and then discharging the whole mass in such volume and with such head as to ensure the production of a cleansing flow through the siphon, the construction of which is as follows:

It was necessary to lay the siphon at one side of the bridge on account of the mud sills interfering with its bedding if placed under the bridge. Piles four inches square were driven opposite each bent of the bridge and capped and supported. A temporary platform was built at the water level to work from, both in excavating the bottom and in leading the joints. The pipe was supported from timbers six inches square placed on top of the cap pieces. There was quite a strong current, and guides were driven at every other joint to prevent the pipe swinging out of line in lowering. The excavation was mostly sand. Clay was encountered in two places. A few small stones were encountered but these were easily removed with rakes. After the bottom was excavated, the lower staging was removed. Men were placed at the supporting ropes at each joint; a mark was made on each rope one foot from the timber, and every line was slacked off as uniformly as possible and held at the mark. This operation was repeated until the pipe rested on the bottom.

The accompanying illustration shows the pipe swung, ready for lowering. Figure 1.

Another difficulty consisted in the fact that as the lower portion of the Winnepesaukee river and the adjoining bay of the lake into which it discharges are so much used for pleasure boating ("The Laconia Navy"), it was entirely inadmissible to discharge sewage at the shore. Both outlets are carried to the deep channel where the river flows into the lake, through iron pipes, that on the east side being twelve inches in diameter and one hundred and thirty-five feet long, and that on the west side being fourteen inches in diameter and three hundred and thirty-one feet long. These pipes are laid in the sand from the shore to about the point of discharge.

The placing of the fourteen-inch outlet (Water street) is

shown in figures 2 and 3. The trench was close sheeted and it was found necessary in places to drive a board outside in order to cover the joint. Pieces of bagging were also used for the same purpose. The water was not pumped out at all but the sand was so fine in places that it ran through the smallest opening. One set of rangers was placed at the water line and the sheeting was driven about a foot below the bottom of the trench. This held it in place perfectly. The last three lengths of pipe were laid on a platform which was lowered to a pile support at its outer end. The pipe was supported in the same manner as at the other outlet and at the bridge. It was lowered nearly to the rangers at the surface of the water. These rangers were then taken out and placed above the pipe. The pipe was then lowered to grade and enough sand thrown in to bed it. The sheeting was then drawn.

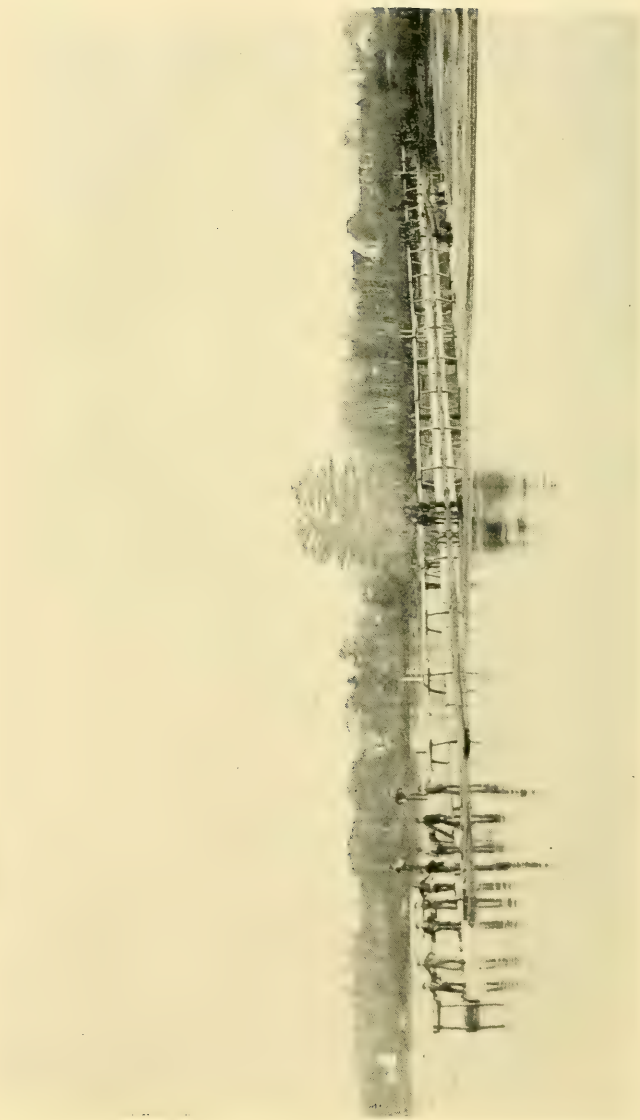
Except for these peculiarities and for the use of "inspection pipes," to be described below, the system is substantially the same as that at Keene. It comprises 10.28 miles of sewers, all of pipes ranging in diameter from six inches to fifteen inches, 65 per cent of the whole being six-inch. There are forty-five flushtanks, thirty-one manholes, and eighty-two inspection pipes. The work is not yet entirely completed and exact figures cannot be given, but the amount paid under the contract will be not far from \$54,000.

The work was begun July 7, 1891 and was practically completed by November 20, 1891. It was all carried out under the engineering control of Waring, Chapman & Farquhar of Newport, R. I., my partner, Mr. Chapman, being the engineer in charge.

The inspection pipes referred to above are an improvement added since the work at Keene was done. They take, very largely, the place of manholes and are placed at intervals of about two hundred to three hundred feet, average. They consist of an iron pot or chamber built at the surface of the street with an iron cover, all being strong enough to stand the concussion of traffic. This chamber which is about



15 - INCH OUTLET BEING LOWERED.



ARRANGEMENTS FOR LOWERING THE 15-INCH OUTLET.

twenty inches in diameter has two oblique arms, set at an angle of forty-five degrees and pointing, one up stream and one down stream. The openings into these arms are closed by cast iron doors, held fast by an iron bar between them which is fastened in place with a Yale lock. The arms are long enough to enter the collars of eight-inch pipe, which rise obliquely toward them from the top of the sewer. The lowest pipe of this oblique connection, on six-inch sewers, reduces in size from eight-inch to six-inch and enters the branch of the sewer. By removing the cover, releasing the bar, and uncovering the arms, a straight line of sight is given into the sewer so that by throwing down the light from a bull's-eye lantern, the condition and character of the flow can be perfectly inspected.

The details of these appliances are shown in the accompanying cuts. Figures 4 and 5.

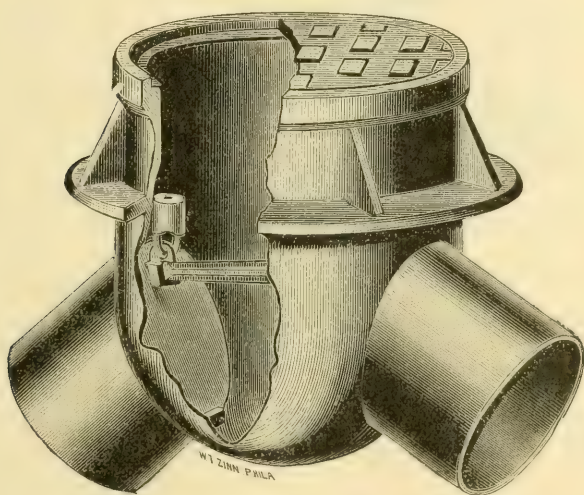
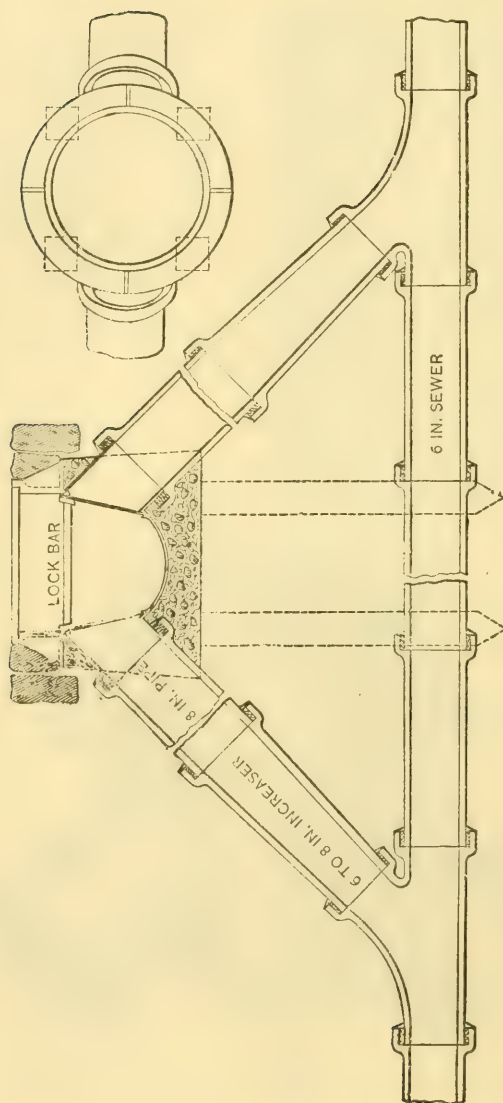


FIGURE 4.



Cords can be floated from the down-stream arm of one chamber to the up-stream arm of the next below, by which ropes may be drawn through, carrying steel brushes, or whatever other appliances may be used in cleansing. When sewers are to be cleansed by passing balls through them slightly smaller than their interior diameter, so as to produce a cleansing current as the sewage flows around the ball, a strong cord is attached to the ball by which it is kept under control until it shows itself at the inspection pipe below, where it may be pulled up, or it may be drawn back to the starting point.

In case of stoppage, the sewer may be easily plugged, through the down-stream branch of the inspection pipe next below, and then filled with a solid column of water, which being churned with a plunger from the up-stream pipe, produces a direct movement on the obstruction and sets it free. These pipes have the advantage that they make it possible to do all cleansing work from the surface of the street instead of working in the contracted quarters at the bottom of a manhole. As their openings are locked fast, one of the most serious objections to manholes, the opportunity offered for malicious persons to throw in obstructions, is obviated.

Some difficulty was caused in construction by the uncertainty as to the location of water pipes. "These were laid in the centre, at one side, or diagonally across the streets as the case might be. No record of their location was kept, and a margin of five feet from where the pipes were supposed to be, proved to be none too much.

The material used for these sewers was granite pipe, manufactured by Knowles, Taylor & Anderson of East Liverpool, Ohio. It was very satisfactory save that a considerable amount of the smaller sizes had to be rejected because it was not straight. "The bells were especially large and there was not a single pipe that required chipping." This is a great recommendation.

The joints of the pipes were inspected and carefully covered before the cement had set. Damage to be caused by jarring the pipe and cracking set cement was thus avoided.

Wherever water was encountered even to a small amount in the holes dug for the bells of pipes, the cement was held in place by a strip of muslin tied around it. Where the water was very troublesome, Stanford's joints were used with very satisfactory results.

During the whole time of construction, from July 7 to November 22, only one whole day and five half days were lost on account of rain.

The ground in which the sewers are laid is variable, some of it difficult. Much trouble was caused by unexpected caving and sliding, largely due to the proximity of old water and gas ditches near the line.

At this writing, the system is being tested by passing through all of the lines balls two inches less in diameter than the bore of the pipe. These balls are attached to cords and are flushed through from one inspection pipe or manhole to another, demonstrating the safe condition of all the work.

AMERICAN PUBLIC HEALTH ASSOCIATION.

EIGHTEENTH ANNUAL MEETING.

REPORTED BY G. P. CONN, M. D., DELEGATE FROM THE
STATE BOARD OF HEALTH.

The eighteenth annual meeting of the American Public Health Association was held in Charleston, South Carolina, and there was a good attendance. The North and West being largely represented and the Dominion of Canada, as well as the Republic of Mexico were officially represented by order of their respective governments.

MORNING SESSION, — TUESDAY, Dec. 16, 1890.

The meeting was called to order at 10 o'clock A. M., the president, Dr. H. B. Baker of Lansing, Michigan, being in the chair.

The Hibernian hall was the place selected by the committee of arrangements in which to hold our meetings, a public building with which there has been associated much of a historical character and which was one of the public buildings that suffered much injury at the time of the terrible earthquake disaster in 1886, but to-day presents a beautiful object lesson of the energy, indomitable will, perseverance, and courage of the people of Charleston, for the building has been restored to its former conditions, and there is scarcely a mark to show the convulsive power that for the moment seemed ready to destroy the city.

The association after very short, formal, and routine exercises proceeded to the programme, the first paper being the Federal District in the Republic of Mexico, as a suitable residence for persons predisposed to tuberculous affection, and for the relief of pulmonary consumption, by Dr. Domingo Orvañanos, member of the superior board of health of Mexico.

The paper graphically presented the claims of this district and gave some valuable statistics and information.

“The prevention of tuberculosis; a century’s supervision in Italy, under the influence of the preventive laws of the kingdom of Naples, enacted in 1782,” by L. F. Flick, M. D., of Philadelphia, member of the Pennsylvania state board of health, was the next paper read. It showed a most careful investigation of the history of tuberculosis and gave some sound advice upon the necessity for cleanliness and keeping away from places in which consumption was common, as at Nice at certain seasons.

The next paper, on ventilation and impure air, as prophylactic or causative of disease, by P. C. Remondino, M. D., president of board of health, San Diego, California, was read by title.

TALKS ABOUT TUBERCULOSIS.

The last paper of the morning session was read by Dr. B. F. Wyman, of Aiken, on the prevention of phthisis. Although a short paper it was an excellent one and incidentally showed the great advantage of Aiken as a health resort of unquestioned importance. The claims of Aiken were practically presented by one who has had fourteen years of experience in the treatment of consumptives at Aiken.

Dr. Baker, president, announced that the association was ready to hear discussion upon any one of the subjects read.

Dr. Albert L. Gihon, of the United States navy, said that something ought to be done to prevent the general expectoration of consumptives on cars, vessels, and elsewhere. He hoped that if nothing else was done a committee would be

appointed to take the matter in hand. The promiscuous and liberal expectorations of those affected with tuberculosis ought to be regulated in some way. He remarked that the real object of the association is to look after the prevention of the disease, and not so much at its cure.

By request, Dr. Kemp, of Brooklyn, an expert bacteriologist, said about the spread of bacilli that the bacilli of tuberculosis were very tenacious of life in their dry state. That his own experiments showed this, and that he called the disinfecting of the sputa the keynote of the situation.

Dr. Bryce, of Ontario, said that there were conditions which made health resorts favorable for some and bad for others of delicate constitutions, and that this fact should be regarded by physicians. He recommended sanitary precautions at boarding-houses and health resorts.

Dr. Rohé, of Maryland, said that if the proper precautions were not taken at health resorts the doctors need not recommend them to their patients.

Dr. Johnson, of Chicago, said that the bacilli were always present, and that there were certain places at which they did not act as in other regions. He advised the sending of patients of tuberculosis to cold and open regions, where the bacilli cannot live. Crowded cities were the worst places for consumptives, and that they should always be made to leave cities.

Dr. Beverley thought that the great mistake of patients was not to take up a permanent residence at some health resort.

Dr. Raines thought there was great danger from spitting on the sidewalk. This pernicious habit was a great aid to the spread of this dread disease.

Dr. Vandenberg, of Buffalo, said offices and banks ought to be looked after and some system of ventilation and cleansing adopted.

Dr. Gihon introduced the following resolution, which was adopted :

Resolved, That a standing committee of five members be appointed by the president to formulate practical prophylactic

measures for the prevention of the spread of tuberculosis, especially looking to the protection of the healthy members of this community from tuberculosis infection.

Dr. Ames, of the United States navy, related how the people of Japan got rid of their sputa by carrying sheets of paper in their sleeves, which they used as handkerchiefs. These were afterward destroyed. He also gave observations of the effects of elevation on consumptives.

Dr. Flick, of Pennsylvania, thought that it was an erroneous idea to suppose that the bacilli of tuberculosis existed everywhere. The real purpose should be to get at the real home of the bacilli. The homes of the poor ought to be considered. By preventing exposure to the disease excellent results could be secured.

Dr. Wyman said that the physicians of Aiken had all drilled into the boarding-house and hotel people the necessity of destroying the sputa. There is a certain instinct of consumptives to hide their sputa. In Aiken our washerwomen are liable to the disease to a remarkable extent. I have thought it due to the handkerchiefs in which the patients spit. In our resorts the people are very particular about the sputa.

Dr. Wyland, of the United States navy, said: "I think something ought to be done to keep out immigrants who have any pulmonary troubles. Such people ought to be kept out of the country."

After further discussion the association adjourned to meet again at 4 o'clock.

AFTERNOON SESSION.

The association met promptly at 4 P. M. The first paper read was that of Prof. José L. Gomez, of the superior board of health of Mexico. The subject was "Swine red disease in Mexico." The paper was read by Dr. Gihon. It was a very elaborate and carefully prepared statement of the results of many specific and general investigations in the hog-raising sections.

Dr. Hibbard, of Indiana, asked if swine red disease is the same as our hog cholera.

Professor Gomez replied that he thought it was.

THE TURKISH BATH

Was the subject of the next paper. Dr. Chas. H. Shepard, of Brooklyn, had prepared an admirable paper on the sanitary advantages of the Turkish bath. In the absence of Dr. Shepard the paper was read by Dr. Bailey, of Kentucky.

The paper related how the Romans used their hot baths as regularly as they attended to their religious duties. An English physician first brought the bath to the attention of his people through an incident brought to his attention while in Turkey. The special case which brought the matter up was the saving of the life of a man who had a sunstroke, by the use of the Turkish bath. Twenty-seven years ago it was introduced into the United States at Brooklyn.

It is computed that in England there are 125,000 deaths from causes which may be easily prevented. Heat being one of the best disinfectants, the hot air of the Turkish bath is a positive disinfectant. Steam destroys bacilli. The tolerance of the body for heat is shown by those who constantly use the Turkish bath.

An inability to perspire is apt to bring about disease, consequently perspiration brought about by a Turkish bath is extremely desirable. The Turks move their armies with less loss than any other. The English army counts on a loss of ten per cent from sickness. The bath brings the body in excellent condition to withstand disease or sickness. The Turkish bath is regarded as cleansing the inner, as well as the outer body. The writer gave an array of important facts in which the sanitary effects of the Turkish baths were shown.

SOME NOTES ON CHEMICAL DISINFECTION.

Dr. F. P. Venable, of the University of North Carolina, yet a comparatively young man, by his paper on "Chemical disinfection" showed that he had made many valuable and important examinations, and that he was a careful student of

this most important question. He thought that it would be well for state boards of health to publish lists of disinfectants which could be recommended. The paper caused more discussion than any thus far read.

Dr. Ashmun, of Ohio, said that this paper proved the necessity of the study of the question of disinfection. It also showed the intimate connection between bacteriology and chemistry.

Dr. Venable agreed that it would be a most excellent idea to have the two sciences brought together, i. e., bacteriology and chemistry.

Dr. Hibbard remarked that in his own town the health officer is using a vigorous system of disinfection against diphtheria.

Dr. Venable: "Wherever the corrosive sublimate can be avoided I think it would be well to do so."

Dr. Flick: "I have frequently used corrosive sublimate on myself as a disinfectant, and I have never experienced any trouble."

Dr. Ames: "I have used corrosive sublimate in disinfecting clothing of men on board of a vessel after an epidemic of small-pox without any bad effects."

Dr. Raymond, of Brooklyn: "The association has already published its report and we can find the information in an available shape."

Dr. Rohé: "I have been in charge of a hospital in Baltimore where we use for all the bed clothing bichloride of mercury. Every week the rooms are scrubbed with this solution. No one has ever yet suffered from this process."

Dr. Clark, of Buffalo: "When small-pox was an epidemic we used bichloride of mercury very freely without any evil results."

Dr. Durgin, of Boston: "We are using the solution freely in our hospitals. We have been doing this for about five years, and I have never yet heard of any evil results. As to the chloride of lime, we have used that freely. For small-pox we have used fumigation by sulphur."

Dr. Perkins, of New York: "I sympathize with Dr. Venable in his paper, and agree that we have much to fear from the lavish use of these special disinfectants."

Dr. Chapin, of Massachusetts: "If there is any danger from mercurial disinfectants, it is, I think, from continued living in a room filled with them."

Dr. Wilson, of Connecticut: "I acknowledge a lingering suspicion that mercurial disinfectants could be used to excess. I would, I think, use it with care."

Dr. Lewis, of Kansas City: "Our board of health has refused us the right to use bichloride of mercury for general disinfection."

Dr. Gihon: "I would move that a new edition of the report of the committee on disinfection be published."

Dr. Robinson, of Maine: "The whole ground has already been covered. The report of the committee has been accepted by the country and is now in general use."

Dr. Bailey did not think that there was sufficient additional information to warrant any expenditure at this time.

Dr. Lindsley, of New Haven, thought it advisable to have boards of health instructed in the use of disinfectants.

Dr. Daniells, of Wisconsin, asked that some instructions regarding the amount of moisture be incorporated in the resolution of Dr. Robinson. Carried.

The association adjourned at 6.10, to meet at the Grand Opera house for the evening session.

EVENING SESSION.

It has been a custom to devote the first evening of the meeting to the reception of the association by the citizens; and in this, Charleston came to the front and entertained our delegation most royally.

The meeting was called to order promptly at 8 o'clock by Dr. H. B. Horlbeck, chairman of the local committee of arrangements, who introduced the Rev. Dr. C. S. Vedder, who opened the session with a prayer.

DR. J. S. BUIST.

After music by the orchestra Dr. Horlbeck introduced Dr. J. Somers Buist, Dr. Buist in welcoming the association said that the city of Charleston was alive to the honor which had been done her in being selected as the place of the meeting of so distinguished a body. Here, he said, was a body of men who were not only physicians but scientists, and who, without hope of reward, were working to place truth before the world. They were striving to make system and order displace ignorance and superstition, and to place before the public the needs of health. He sketched briefly the history of sanitation and how the great work had been so much aided in America by this association. In conclusion, Dr. Buist paid a high tribute to Dr. Koch, of Germany, and spoke of the great work he was doing for science in completing his discovery of the consumption cure.

PRESIDENT BAKER.

Dr. Buist was followed by Dr. Henry B. Baker, of Lansing, Mich., the president of the association, who delivered his annual address. The object of the association, he said, was implied in the name. It was devoted to the advancement of sanitary science and the promotion of public hygiene. He spoke of the difference in the methods of the various States in this work, owing to the laws which existed in different parts of the country. Not only, he said, was the whole of this country interested in the work of this association, but so were also the provinces of Canada and the Republic of Mexico. The latter country had here an official representative.

A mere abstract of Dr. Baker's paper fails to do it justice. It is to be published and should have a large circulation.

MR. J. P. K. BRYAN,

The next speaker, said that he rejoiced to welcome the distinguished visitors to a city that was known as the home of Agassiz, Simms, Thomas, Holbrook, Bachman, and Geddings, and to add his God-speed to the noble work of the

association. If our ideas of sanitation fell short of the highest mark, yet two object lessons in the study of public health may be found here. One has reference to our tropical relations and influences. By the wisdom and courage of the sanitary system, we have for nearly a generation been free from a scourge that has ravaged a sister city quite recently.

Another object lesson is presented by the most complete system of quarantine at the mouth of our harbor — a monument to the vigilance that rules here.

The theme discussed involves wide-spread interests and holds in its grasp the sunshine and happiness of our homes; among its aims are pure air and pure water. It concerns the intelligent dominion of Nature, whose secrets it elicits by the wand, as it were, of a modern enchanter. It has lengthened life, mitigated pain, fertilized the soil, spanned rivers, lighted up darkness, annihilated distance, facilitated correspondence, sounded the depths of the seas and the recesses of the earth, explored mountains, turned the course of rivers, subjected storm and whirlwind; but, better than all these things, it has stayed the black plague of despair and imparted to the poor leper and consumptive the hope of a new miracle, "Be thou clean and go in peace." Its activity is ceaseless; its goal to-day is its starting point to-morrow. The transfer to man of the mastery of creation tends to bind his soul to his Heavenly Father.

What a noble work! Consecrated to the good of his fellow-man and making all men kin in its mission of mercy. The majesty of this great republic bends in homage before it, but the still greater concourse of humanity waits to learn from its further ministrations. We have to-day a grander Olympia than the ancient Greeks, and our lists are open to all genius, whether in art, oratory, or song. The minds of all men turn naturally to an assemblage called to consult for the good advancement and glory of man. Mighty the victor and happy he who wins in such a contest. There are unknown heights and depths awaiting the lover of light and of men in this new world.

The last speaker on the programme was the eloquent pastor of the Huguenot church and the gracious presiding officer of the New England society, Rev. C. S. Vedder, D. D.

He said to the gentlemen of the Public Health Association : "The officials who have you in custody have determined that the capital sentence passed upon you should not be executed without 'benefit of clergy.' You had, perhaps, not expected the grace, nor been conscious of your need of it, but men are not always the best judges of the gravity of their own offenses, nor of the consideration which deals with them leniently. My friend, Dr. Buist, acknowledged expert, has diagnosed your case, and pronounced unqualifiedly as to your sanity — nay, he avers that you are not only sane, but even sanitary in organization. The learned solicitor, Mr. Bryan, with characteristic cogency, has presented an argument which seals conviction. You have been found here, if not with arms in your hands, at least with hands on your arms, and if we have not already seized these evidences of the spirit with which you have come, we will do so soon. The community of Charleston, sitting as a Court of Winter — if not of last — resort has arraigned you in this building, so full of tragic memories, and you can expect no mercy. Charleston is remorseless in cases like this. There is no appellate court which can set aside or stay its judgment. There is only one high tribunal — St. Michael's steeple — from which a peal is ever heard in this jurisdiction, and if this be heard now it will only be to drown your cries at the hardships to which you will be subjected, or to add to those hardships by triple bob majors of exaltation from a repertoire which the recent gala week proved to include some strains of an effective character for circumstances like the present."

The speaker then went on to formulate the charge against the health association, of seeking to find and eradicate the seeds of human malady, and thus interfering with the livelihood of their many and good and well-beloved physicians, taking the bread out of their mouths by forbidding them to put bread pills in the mouths of others. And though their doctors gave

us welcome and were glad of our advice and aid in thus playing at cross purposes with their bread and butter, yet the community would not stand silently by and see its endeared medical men thus ruthlessly immolated upon the altar of self-sacrifice; and, therefore, the community had adjudged that the members of this Public Health Association should be visited and persecuted by all forms of public and social attention and courtesy, be immured in a building where they must wrestle with bacteria, bacilli, mephitic vapors, miasmatic conditions, and like savory matters, whilst the community looked on, uninterfering and un pitying. From time to time, to aggravate their imprisonment by contrast, they were to be taken out and around the city, to bemoan the fate that compelled them to live elsewhere, save, of course, in the favored localities, so much like Charleston, where they did reside; taken into their homes, so much sweeter than any others, except, of course, their own; be made to get, if not "half seas over," at least "over the bay," by being taken down to the bar; be invited to ride in railway coaches, where no dust could penetrate, and to explore the splendid system of drainage, without any drain upon their susceptible olfactories, etc., etc.; and when they had reached the limit of human endurance and were ready to go, to see their persecutors so unaffected by compunctions as to be willing to endure the whole programme, and hearing them giving to the health association the hearty send off: "Come again, as soon, as often, and in as great force as possible." The jury of the city has been polled, and it cries: "So say we all."

MORNING SESSION, — WEDNESDAY, Dec. 17.

Dr. Ashmun, of Cleveland, Ohio, submitted a report on behalf of the committee appointed to study and submit a paper on the cause of prevention of diphtheria. The committee had made a careful investigation of the question, and had made careful inquiry into the origin of this terrible disease. Of the answers received by the committee, 93 per cent indicate that diphtheria is dependent upon some specific cause.

The paper states that the opinion is that light-eyed and light-haired children are more liable to diphtheria than those of dark complexion and eyes. Cold, wet weather is the most calculated to spread the disease. In answer to the question whether domestic animals and fowls were regarded as subject to diphtheria and liable to give the contagion to children, 60 per cent of the answers indicate that dogs, cats, and fowls are subject to diphtheria, and their furs and feathers likely to carry the virus and give the terrible disease to children who play with them. Such cases have been actually observed.

The free use of antiseptics is advised. Stations for the disinfection of diphtheria are also advised.

The paper provoked considerable discussion, and a variety of opinions was expressed.

Dr. Wyman said that he had found that children of parents of weak lungs are very much more liable to diphtheria than others. He regarded the germ as being vegetable. He had found sulphur the best disinfectant. He regarded sugar-cane as a possible origin for the germ. He did not regard the disease as contagious.

Dr. Rohé suggested that the other members of the committee present be asked to say something about the report.

Dr. Bryce, of Toronto, one of the most careful and deliberate talkers on the floor, said that it was very difficult and practically impossible to tell from the examination of the throat whether a patient had diphtheria. We are to look upon every case as diphtheria until the contrary is proven. Four weeks he regarded as a proper time for isolation.

Dr. Kemp, of the Hoagland Laboratory, of Brooklyn, said that it was a difficult matter to find the bacilli of diphtheria.

Dr. Cantwell, of Iowa, related an experience in which one child was known to give the disease to forty children in a hospital.

Dr. Hibbard, of Indiana, asked: "How long do the bacilli of diphtheria live?" He related a case where a mother with two children visited a neighbor's house after the diphtheria had been thought cured in the patient for a month. Soon after both children died.

Dr. Kemp: "I do not think any examinations have been made on how long the bacilli live in rags and dirt. They will live in media for three months. How long they may live in a house is not known, I think."

Dr. Bahnson, of North Carolina, related a case which he thought showed that the bacilli of diphtheria lived for three years in a room.

Dr. Carter, of Indiana, said that the bacilli of diphtheria might be found in the milk of cows.

Dr. Daniells, of the University of Wisconsin, doubted if the disease was ever spread by water, and would like to know whether an explanation of this could be made.

Dr. Rohé moved that the resolutions of the committee looking to the establishment of stations and distribution of information to every state board of health be adopted.

The resolutions of the committee on diphtheria were adopted.

Dr. Rauch, of Chicago, introduced a resolution looking toward adding to the regular quarantine diseases, diphtheria, typhoid fever, measles, and chicken-pox. This, he thought, was necessary in addition to the present regulations regarding small-pox, yellow fever, and cholera. This regulation he regarded as necessary for all emigrant steamers.

Dr. Gihon moved that the committee on the pollution of water be continued. Carried.

The first regular paper submitted during the morning session was: "What constitutes a filth disease?" which was prepared and read by Dr. Samuel W. Abbott, secretary of the Massachusetts state board of health. Rags were occasionally the medium for the transmission of small-pox. The dust of some work houses may be the medium of disease. Phthisis is often communicated in this way. It is claimed that filth is often the origin of diphtheria, but the connection of filth to diphtheria is not quite so clear as it is to other diseases. He traced the history of diphtheria in a small town for eighteen months, and how its germs kept in an untenanted house for six months. Filth should be removed with intelli-

gence. It is a condition and not a cause of disease. The paper was well received.

One of the most technical and valuable papers read during the session was, "Some original observations on the value of microscopical, spectroscopical, and chemical examinations of black vomit as an aid to health officers in distinguishing yellow fever from malarial fever," by George T. Kemp, Ph. D., director of physiology and experimental therapeutics, Hoagland Laboratory, Brooklyn, N. Y.

Dr. Kemp has made quite a number of examinations of the vomit of yellow fever patients as well as malarial subjects and presented in a concise manner the results of his investigations. He presented in tubes several samples of yellow fever bile and made some very valuable suggestions on yellow and malarial fevers.

At about noon the association took a recess to accept the invitation of the "Emerson Car Ventilating Company" to witness the practical workings of a car, which had been fitted up after their patent, in a run of ten or fifteen miles up the Northwestern Railway to the delightful grounds of the Otranto club, near which is located the historic Goose Creek church, quaint in architectural design, having been built in 1706, and the famous avenue of large-sized water-oaks draped in flowing robes of perennial moss.

The following description of the Emerson system of car ventilation was given the association by Dr. J. Somers Buist, one of the projectors of the enterprise:

"Exclusion of dirt, dust, smoke, cinders, in the system alluded to (Emerson) is accomplished by keeping the car closed entirely, neither windows nor doors being opened, and all ventilators in the roof of the car or upon its sides being closed or removed. It will thus be seen that there is no possibility of the introduction of these disturbing elements from without, and should they enter at any time would be as rapidly removed as possible before they could find a lodging by the system at work to exhaust the foul air, to be now described.

"The introduction of air into the car thus practically sealed,

is accomplished by means of an apparatus attached under the car near one of the trucks, the motive power being derived from friction which comes into operation at the first turn of the wheel, and continues to work, either fast or slow, until the cessation of the movement of the train. It is understood that while the train is stationary both windows and doors will be opened to admit air if needed. The friction power being brought into operation moves a series of fans, which collecting the air, filled as it is with dust and impurities from beneath the moving train, rapidly passes it forward into a box attached from about two or three feet from the wheel, where it is divested, by passing through water and chemicals, of all impurities, and transmitted in a steady, uninterrupted flow into the interior of the car by a series of tubes of different sizes and dimensions, placed at proper intervals in different points of the car, either at the sides, in the ceiling, or in the floor, as taste and utility may direct and practice establish. These orifices of entrance are so arranged as in no way to create draft or affect the person of the individual. A series of fans attached to the same motive power and washed in the same apparatus and moving in opposite directions, constitutes the exhausting system, accomplished through orifices of exit placed in the upper part of the car; and as the balance between the entrance of air and its exit is equal, the influences of draughts are dispelled and an even temperature preserved. Pure air coming in at all times and in equal volumes, and air breathed being as rapidly removed, renders the ventilation perfect. On the same principle and with the addition of a coil of steam-pipe, heated air is introduced, and in cold weather the temperature of the air can be regulated to any degree found necessary. Accurate tests made of this invention have thus far shown:

“1. Complete exemption of dust and smoke from the interior of the cars.

“2. Pure, uncontaminated air entering in sufficient quantities to fill every requirement, and even reducing the temperature in the interior of the car many degrees, as shown by the mometrical test.

"3. The immediate removal of foul air as rapidly as it is generated, the solving of the great problem that has hitherto been the stumbling block in the way of the perfection of the system.

"The inventor claims the ability to reduce the temperature in hot weather to one that is pleasant and comfortable."

EVENING SESSION.

The executive committee met at 7 P. M., and at 8 o'clock the evening session of the association was held, when the following papers were read:

"Underground Waters for Public Purposes," by Peter H. Bryce, M. D., secretary provincial board of health, Toronto, Ontario.

"Sulphuring or Bleaching Dried Fruits, a Mistake if not a Crime," by Joel W. Smith, M. D., of Charles City, Iowa.

"Sanitary Improvement of Stagnant Lakes near the Seashore," by Joseph H. Raymond, M. D., of Brooklyn, N. Y.

"The treatment of Sewage by Precipitation and Saturation," by Joseph H. Raymond, M. D., of Brooklyn, N. Y.

Dr. Raymond showed with his serviceable stereopticon the construction of tanks for the precipitation of sewage; the force of waves, as shown by the wrecks of walls and buildings, the construction of conduits and other matters connected with the explanation of the papers he had prepared. Dr. Raymond contributed two of the most excellent and interesting papers before the association.

"The relation of mechanical arts to preventative medicine, particularly illustrated by the artesian wells and tidal drains of Charleston," by A. Nelson Bell, M. D., editor of *The Sanitarian*, Brooklyn, N. Y.

It showed a careful study of the question, and especially of the artesian well and tidal drains of this city. Dr. Bell gave in his paper a complete and minute history of the drains and wells in Charleston. He quoted a number of authorities upon the sanitary systems of the city.

THE TIDAL DRAIN SYSTEM OF CHARLESTON.

Mr. L. J. Barbot presented a most interesting and valuable paper on the tidal drain system of Charleston. Mr. Barbot showed that he had the subject, which he had made a study for years, at his fingers' ends, and his explanations were so complete and graphic as to be perfectly understood by all.

Upon motion, Dr. Bryce's paper, which was deferred from the afternoon session, was made the special order for the first place in the morning.

The association adjourned at 10.15 P. M.

MORNING SESSION, — THURSDAY, Dec. 18, 1890.

After a report by the chairman of the committee of arrangements the following resolutions were recommended by the executive committee and passed.

By Dr. Wood: That a committee of this association be appointed to confer with a similar committee of the American Medical association to observe in some appropriate way the centennial of the discovery of vaccination.

By Dr. Rohé: That the report of the committee on the cause and prevention of diphtheria be printed in pamphlet form as soon as practicable and that copies be furnished to each state board of health.

Dr. Gihon: That a standing committee of five members be appointed by the president to formulate practical prophylactic measures for the prevention of the spread of tuberculosis, especially looking to the protection of the healthy members of the community from tuberculosis infection.

The favorable report of the auditing committee upon the treasurer's report was next adopted.

HYGIENE OF COOKING.

Dr. Abbott, of Boston, said that one of the most important works ever done by the association was the publication of the prize essays written for the "Lomb Prizes." The essays are now regarded as high authority. One of these essays was

by Mrs. Abel and gave valuable and new information about the kitchen.

Dr. Walcott, of the committee on health commissioner, was not prepared to submit a report. He asked that a committee be appointed to see what could be done with the present Congress towards securing the legislation desired.

The association adopted a resolution appointing a committee on legislation.

Dr. Plunket, of Tennessee, thought that it would be advisable to appoint one representative from each State and Territory on the committee on legislation, and that better results would in that way be accomplished. Carried.

IMPORTED DISEASES.

Dr. Durgin, of the committee on sanitation of foreign ships, submitted an excellent report. The fact that during the past ten years over five millions of immigrants have come to America ought to give the question considerable interest. Statistics showed that of the population of 1880 there was one pauper to every 985 native-born Americans, and one pauper to every 285 foreign-born inhabitants.

The ventilation of emigrant vessels, he said, was very defective. The unclean habits of most emigrants, the poor accommodations and miserable ventilation of our steamers are very likely to produce disease. There is a great lack of necessary information on hygiene among the officers of vessels. The law giving the master entire control of the vessel is not desirable. The health officer should have more authority. Better protection to the country requires a revision of the present laws. There should be requirements that all persons leaving or coming into the country should be subject to a thorough medical examination, and no one suffering with an incurable or contagious disease should be permitted to come into the country.

Vaccination should be required.

Proper ventilation of emigrant vessels should be required.

Every vessel should have one credited health officer to every six hundred passengers or less.

The medical inspector should be required to inspect the vessel daily and report to the master.

The master should be required to answer all demands of the vessel's health officer.

VACCINATION.

Dr. Gihon moved that the paper on the vaccinal protection of passengers from Europe, by Frederick Montizambert, M. D., quarantine officer of the Dominion of Canada, Quebec, be next read, as it had direct bearing upon the question under discussion. Carried.

The paper of Dr. Montizambert was a clear and practical demand for the enforcement of laws requiring vaccination of all persons coming into the country. The nation demanded such protection and he hoped that the association would do its best to secure the necessary legislation. Small-pox, wherever found in America, had its origin on foreign vessels. It is never native-born. There was absolute need for imperative laws upon vaccination and he was very sorry that America did not have any laws requiring general vaccination for all immigrants.

The report of the committee and the paper of Dr. Montizambert will be a great acquisition to the matter to be used in urging strict enforcement of quarantine laws and the passage of stricter laws.

The two papers will be published and copies sent to the members of the American and Mexican Congresses and the Canadian Parliament. Dr. Gihon thought that some good results could be expected from such a publication and distribution.

The last paper read before the departure for the quarantine station at Fort Johnson was, "Maritime Sanitation at Ports of Arrival," by H. B. Horlbeck, M. D., quarantine officer of the port of Charleston. The paper was one of the most admirable presented to the convention. It was clear, concise, and well framed, and gave to the members of the association a full insight into the workings of the station at Fort Johnson.

He gave an elaborate and detailed account of the quarantine laws of Charleston, and showed how rigorously the health of Charleston was guarded in colonial days against the importation of disease. Yellow fever, its origin and how it became prevalent in Charleston, were thoroughly discussed by Dr. Horlbeck. He gave a graphic account of the plagues of Charleston and the Mississippi valley. The plague of 1864 was introduced by intercourse with the West Indies at that time.

Dr. Horlbeck gave a complete and detailed account of the workings at the quarantine station over which he has direction.

At the evening session the following papers were read :

“The Hygienic Value of Rational Irregularities in Habits of Living,” by James F. Hibbard, M. D., of Richmond, Ind.

“Land Monopoly to Population Health,” by George Homan, M. D., secretary state board of health of Missouri, St. Louis, Mo.

“Climate in Phthisis,” by W. H. Geddings, M. D., of Aiken, S. C.

“House Drainage,” by Albert L. Webster, Sanitary Engineer, New York.

“Trap Siphonage,” by Prof. James E. Denton, Stevens Institute of Technology, Hoboken, N. J.

The following resolution was adopted :

Resolved, That a committee of five be appointed, of which Dr. John H. Rauch, of Chicago, shall be chairman, to inquire into the expediency of having a sanitary exposition at the International Fair in 1893.

Report from the state board of health, South Carolina, by J. R. Bratton, M. D., president.

“Leprosy and its Management in Minnesota,” by Charles N. Hewitt, M. D., secretary of the state board of health, Red Wing, Minn.

The following resolution was adopted :

WHEREAS, Owing to the fact that cholera has prevailed during the past summer in Europe, Asia, and Africa, and

WHEREAS, There is a possibility that it may be introduced into this continent during the coming year; be it, therefore,

Resolved, That all maritime quarantine authorities be urged to continue special care to prevent its introduction, and that all other health authorities continue to do everything in their power to improve the sanitary condition of the country.

MORNING SESSION, — FRIDAY, Dec. 19, 1890.

The programme was made up largely in matters pertaining to unfinished business reports of committees and the election of officers.

The reports of the standing committees were received and ordered published, and a number of papers were read by title and ordered published. The reports and discussions on the Coney Island system of drainage were ordered published in the proceedings.

In response to an inquiry from Mr. Griffith, of Chicago, Dr. Horlbeck gave a sketch of the method of drainage used in Charleston, which was heard with great attention.

The report of the advisory council was presented and ordered published, and the election of officers was then held, with the following result:

President, Dr. Frederick Montizambert, Quebec, Canada.

First vice-president, Dr. T. F. Wood, North Carolina.

Second vice-president, Dr. H. B. Horlbeck, Charleston.

Secretary, Dr. I. A. Watson, Concord, New Hampshire.

Treasurer, Dr. J. B. Lindsley, Nashville, Tennessee.

Executive committee — Dr. George Homan, St. Louis; Dr. A. W. Cantwell, Iowa; Prof. W. W. Daniells, Wisconsin; Dr. L. F. Salomon, Louisiana; Dr. Wm. Bailey, Kentucky.

VISIT TO AIKEN.

The invitation of the citizens and chamber of commerce of the city of Aiken, to the association to visit that renowned

sanitarium, was accepted by over sixty members who were provided with a special train and a bountiful lunch.

On the arrival of the train at Aiken we were received by a large committee of the city officials and others, who escorted us to the Highland Park Hotel and most royally entertained us with a reception and banquet.

It is a delightful city and geographically is finely situated for a resort for invalids, being located upon a plateau over 700 feet above tide water, it is free from dampness and malarial influences so common within so short a distance from the coast.

Those who were so fortunate as to be able to enjoy their hospitality, will long remember the good people of Aiken and their kindness to the members of the American Public Health Association.

HISTORICAL AND OTHER FACTS REGARD- ING VACCINATION.

BY IRVING A. WATSON, M. D.

In this age we know very little of the frightful and fearful epidemics of small-pox that have desolated whole countries and left behind only death, poverty, and sorrow in their withering trail, except as we read the terrible revelations of history. The epidemics from this disease for more than a generation, though in some instances very severe, like that of Boston in 1872, and that in Montreal in 1885, in which some three thousand human beings were needlessly sacrificed, are no more to be compared to the epidemics of former times, than the gentle breezes of a summer's evening are to the devastating cyclone.

In earlier times this disease was the cause of *one tenth* of all the deaths in Europe. It is estimated that in all Europe 450,000 died annually from small-pox; 30,000 died each year in France; 27,000 died in Prussia in a single year out of a population of seven millions.

The Europeans carried the disease, by commerce and explorations, from the equator to the frigid zones. The Danes imported it into Greenland; the Spaniards planted it in unhappy Peru, and its ravages were more terrible than the atrocities of their arms; in the single province of Quito 100,000 persons were swept away on its appearance in that country. In the colonial days of our own country it destroyed almost entire communities; as late as 1721 one half of the population of Boston were affected with it at one time.

Its contagiousness, its great fatality, and the horrible disfigurements that were generally stamped upon the faces of those that recovered, made it a disease "more to be dreaded than the plague."

Inoculation was frequently practiced to limit in a degree its ravages, or in other words, the poison of the disease from a fresh case was introduced into the arm of the person. This produced the true small-pox, but usually in a milder type than followed when taken in the natural way. This method, however, was attended with great danger, as the inoculated person not unfrequently died from the disease thus induced; the liabilities to contagion from such a case existed as in an ordinary case; the person inoculated had to be isolated in a "pest house" or hospital. Still with its objections it was, in the days immediately preceding the discovery of vaccination, very generally resorted to, because it was so certain that the disease could not be avoided, and many assumed the risk of inoculation immediately upon the appearance of a case in their locality.

This method, however, was under the regulation of rigid laws, and seemingly left as a monument in history, such an enactment existed in the General Laws* of New Hampshire, until the year 1887, and possibly has not been repealed in other States where it was once legalized.

In 1798 Edward Jenner announced to the world the discovery of vaccination. In 1801, in answer to numerous inquiries, he said,† "My inquiry into the nature of cow-pox commenced upwards of twenty-five years ago. My attention to this singular disease was first excited by observing that, among those whom in the country I was frequently called upon to inoculate, many resisted every effort to give them small-pox. These patients I found had undergone a disease they called the cow-pox, contracted by milking cows affected with a peculiar eruption on their teats. On inquiry, it appeared that it had been known among the dairies time

* Chapter 112, section 5.

† Medical and Physical Journal, vol. v., p. 505, London, 1801.

immemorial, and that a vague opinion prevailed that it was a preventive of the 'small-pox.'

Other writers corroborate the fact that in the agricultural districts of Europe the cow-pox had long been known to dairymen as a protection against small-pox. Pearson,* in 1800, in writing upon vaccination, said: "The safety of the practice is confirmed by the inoculation [vaccination] so long practiced among the peasants in several parts of England, in the rudest manner, with pointed knives, awls, etc., time immemorial."

Barry, a practitioner and writer contemporaneous with the authors just mentioned, says much upon the antiquity of cow-pox and its being known among the peasants as a protection against variola. He says: "The Irish name of the disease (Shinach) belongs to the old written language of the country, and has no relation to the modern colloquial dialect; this I consider a strong proof of the antiquity of the distemper. It is evident from the facts I have stated, and from the remainder which I have myself collected, or received from friends, that the belief of the anti-variolous power of the disease is as ancient as that of the existence of the disease itself."

It would seem that Jenner's great discovery was simply the recognition of facts which were familiar to many of the common people; but it was reserved for him to demonstrate to medical and scientific minds the value of these facts which in a simple way were best known to milkmaids. His own words best describe his progress in proving his theories:† "During the investigation of the casual [natural] cow-pox, I was struck with the idea that it might be practicable to propagate the disease by inoculation, after the manner of the small-pox, first from the cow, and finally from one human being to another. I anxiously waited some time for an opportunity of putting this theory to the test. At length the period

* Pearson did everything in his power to rob Jenner of the honor of the discovery of vaccination, by asserting that he had done more than Jenner to diffuse the knowledge and place it upon a basis to be thoroughly understood by all. His attempt, however, was an ignominious failure.

† Loc. cit., p. 507.

arrived. The first experiment was made upon a lad of the name of Phipps, in whose arm a little vaccine virus was inserted, taken from the hand of a young woman who had been accidentally infected by a cow. Notwithstanding the resemblance which the pustule, thus excited on the boy's arm, bore to variolous inoculation, yet as the indisposition attending it was barely perceptible, I could scarcely persuade myself the patient was secure from the small-pox. However, on his being inoculated some months afterwards, it proved that he was secure. This case inspired me with confidence; and as soon as I could again furnish myself with virus from the cow, I made an arrangement for a series of inoculations. A number of children were inoculated in succession, one from the other; and after several months had elapsed, they were exposed to the infection of the small-pox — some by inoculation, others by variolous effluvia, and some in both ways — but they all resisted it. The result of these trials gradually led me into a wider field of experiment, which I went over not only with great attention, but with painful solicitude. This became universally known through a treatise published in June, 1798. The result of my further experience was also brought forward in subsequent publications in the two succeeding years, 1799 and 1800. The distrust and scepticism which naturally arose in the minds of medical men, on my first announcing so unexpected a discovery, has now [1801] nearly disappeared. Many hundreds of them, from actual experience, have given their attestation that the inoculated cow-pox proves a perfect security against the small-pox; and I shall probably be within compass, if I say that thousands are ready to follow their example, for the scope that this inoculation has now taken is immense. An hundred thousand persons, upon the smallest computation, have been inoculated [vaccinated] in these realms. The number who have partaken of its benefits throughout Europe, and other parts of the globe, are incalculable; and it now becomes too manifest to admit of controversy, that the annihilation of the small-pox, the most dreadful scourge of the human species, must be the final result of this practice."

The opinion expressed in the last part of the above quotation will not be taken with surprise by any medical man who has studied the subject of vaccination. It probably was not conceived in the mind of Jenner that quackery, superstition, ignorance, and dishonesty would combine to defeat the results which he predicted; neither will any one regard him as over enthusiastic in describing its prophylactic powers, when it is stated that within five years after giving his discovery to the world, six thousand persons, who had been previously effectually vaccinated, were inoculated with the poison of small-pox, and not one of the number contracted the disease.

Dr. Woodville, of London, within two years after the announcement of the discovery of vaccination, inoculated one thousand well vaccinated persons with the virus of small-pox and none received the infection.

The protection given by vaccination was so conclusively proven that, as a further test, physicians, and in some instances ministers, placed their children in houses infected with the worst type of small-pox, with impunity.

Vaccination was performed to quite an extent by clergymen. Indeed, the better educated among them used every honest endeavor to awaken their parishioners to the great value of the operation. Rev. G. C. Jenner vaccinated "three thousand persons without meeting with one unfavorable case, although he had inoculated [vaccinated] persons from the earliest infancy to eighty years of age." * * * "Upwards of two hundred of his patients have since been inoculated with active small-pox matter, and at least an equal number exposed to contagious effluvia, but in no instance was the small-pox produced."* The proofs of its efficacy were so strong that the operation was introduced from England with great rapidity into every civilized country.

Dr. Waterhouse, "Professor of Physic at Cambridge in New England" obtained some vaccine virus from a friend in Bath, England, and acknowledging the same under date of Aug. 4, 1800, said: "Accept my best thanks for the phial

* Testimony before the House of Commons, 1802.

of vaccine poison. Its activity I have experienced on my nearest connections. I have inoculated five of my own family, and roused the public attention even beyond what I had imagined. The symptoms and appearance in the inoculated part were exactly similar to those described and pictured by Dr. Jenner. I shall try the variolous matter on them in a week or two. I consider this as a very important thing to my country, where the dread of the small-pox is still great.

“I have ventured to give a new name to the vaccine disorder. I observe that people revolt at the term cow-pox. I have therefore changed it to *kine-pox*, from kine, the plural of cow. As I am the only one in America who has published anything on that new disorder, I am in hopes to establish that name instead of the former. If it should obtain, I can foresee that the *c* will be changed in time into *d*.”

This, indeed, is a significant letter and shows from what source the name, which has been so commonly used in this country, was derived. Dr. Waterhouse wrote a small work upon vaccination, in acknowledgment of which he received the following from the president of the United States :

WASHINGTON, Dec. 25, 1800.

SIR, — I received last night, and have read with great satisfaction, your pamphlet on the subject of the kine-pox and pray you to accept my thanks for the communication of it. I had before attended to your publications on the subject in the newspapers, and took much interest in the results of the experiments you were making. Every friend of humanity must look with pleasure on this discovery, by which one evil more is withdrawn from the condition of man; and must contemplate the possibility, that future improvements may still more and more lessen the catalogue of evils. In this line of proceeding you deserve well of your country; and I pray you, sir, accept my portion of the tribute due to you, and assurances of the high consideration and respect with which I am, sir,

Your most obedient and humble servant,

THOMAS JEFFERSON.

To Dr. Waterhouse, Cambridge.

The literature of vaccination, published within three years after its discovery, shows that the subject had been ably considered in all its details, bovine and humanized virus, communication of disease, spurious vaccination, decomposed virus, etc., etc. The anti-vaccinationists presented the same line of pseudo-arguments, and employed the same senseless and demagogical allegations in support of their assumed position as now — perhaps in some respects even exceeding them.

They based one of their strongest points in opposition to vaccination upon the hope of instilling into the mind of the ignorant, the idea that it was a *beastial* disease, or humor, and that by introducing it into the system they received a disease which did not belong to the category of ills, placed by divine favor or disfavor, as the case might best suit the purpose of their argument, upon sinful mankind.

The beneficent discovery was, however, not allowed to be assailed unanswered. To the charge above mentioned Dr. Henry Jenner, a surgeon of London, forcibly said: * “If this very weak and futile objection were worthy of reply, we might observe, that the cow is of all others the most healthy and the most cleanly of our domestic animals, and might also remark, that no females are so healthy as our dairy maids, whose morning and evening hours are spent amongst the cows.” * * * “How void of foundation then must be the objection to the insertion of an atom of matter taken from the teat of the cow, once in the life only, when every person is in the daily habit of introducing into his stomach various parts of the same animal. The human stomach revolts not at beef, butter, cheese, and cream; yet every one acquainted with the animal economy must know that these aliments are quickly mingled with the constitution.”

In as logical a manner was every objection to vaccination met, but the extent of the absurdity to which the opposition was carried by ignorant and bigoted fanatics, may be illustrated by a single quotation from a paper on vaccination, written by

* An address to the public on the advantages of vaccine inoculation, with the objections to it refuted. London, 1800.

Dr. Richard Dunning in 1802. He said: "Some with a well feigned expectation of finding them, and therefore, with an ingenious cruelty peculiarly their own, have sought for, on the heads of children lately vaccinated, the approaching horns, and at the same time have, with equally affected seriousness, inquired if a something had not been noticed in their voices, imitative of the bellowing of a cow."

It should be noted that in the period under consideration, the value of the discovery had not been proven to the satisfaction of all, hence that it, like any new theory, would be assailed was to be expected; but such an attempt as that reported by Dr. De Carro, of Vienna, to bring the operation into disfavor, serves to show to what terrible extremes the effort was carried.

"A law suit of the most abominable sort is now going on at Berlin, between a banker of that town and Dr. Wolf. That physician was requested by the banker to vaccinate his children. He complied with the request; but instead of taking vaccine virus he took variolous [small-pox] matter of the most confluent kind. Those two children died during the inoculation. The parents, astonished to see such symptoms produced by the *vaccination*, made the strictest inquiry, and traced the evil to its origin. A regular charge was brought against that monster, but I do not yet know the result of it."*

The chief danger was then considered to be, and is no less so now, from using virus that was too old, or that taken at an improper stage in the development of the vesicle. The result of the use of such virus is not the introduction of disease into the system, but the creation of a local sore of more or less severity without giving the person any protection. So important was the operation regarded by the physicians in the earlier days of vaccination, that they deemed it necessary to see the patient in a few days afterward to determine whether the result was protective or not. There are numerous persons on whom the operation of vaccination, performed with a point or lancet perfectly clean and free from vaccine

* Medical and Physical Journal, vol. viii, London, 1802.

virus, would cause a sore not less severe than that which often results from true vaccination. Hence, a sore is not unfrequently produced which the subject regards as a vaccination vesicle, when infection from the vaccine matter has not taken place.

Such a person in after years having small-pox, the anti-vaccinationists flaunt the fact as an instance in which vaccination was not a protection. The assertion which has been made, that by vaccination "humors" are introduced into the system, is probably not true in one case, so stated, in ten thousand. It is true that not unfrequently an eruption, or perhaps pimples, appear for a time after vaccination; but who has not seen the same condition produced in some persons by articles of food like mince pie, strawberries, honey, lobsters, etc., or by the taking of certain medicines? The whole solution of the question is in the fact that some systemic disturbance follows, that manifests itself on the skin or elsewhere; some latent so called scrofulous condition may for a time be brought into activity, or a metastasis of a hitherto unrecognized affection may have taken place, relieving some internal organ by placing its burden for a time upon the skin. This is all there is to the so called cases of "disease introduced by vaccination" that it has been the writer's fortune to see. On the other hand, the health is not unfrequently improved by vaccination. Eruptions, classed as scrofulous, upon the face and body have been known to disappear as a result of vaccination, which failed to be removed by medical treatment or local application.

The following may be stated as incontrovertible propositions:

1. That all children should be vaccinated before they are one year old.
2. That vaccination with *fresh* bovine virus, or from the arm of a healthy person, *taken at the proper time and in a proper manner*, can communicate nothing but the vaccine disease.
3. That a person who has had the vaccine disease is pro-

ected from small-pox for a certain number of years afterward.

4. That owing to an unexplained idiosyncrasy the protection afforded by vaccination is, in some persons, exhausted in a few years; hence, revaccination should be occasionally resorted to, especially if small-pox is prevailing.

5. That no reliance can be placed upon the vaccine scar as to how long the protection of vaccination exists.

6. That in a well-vaccinated community small-pox can never become epidemic.

7. That it is the duty of every individual to avail himself of the protection which vaccination affords.

Dr. J. M. Toner puts this idea in the following forcible language: "Parents and guardians have no more right to withhold or neglect to provide vaccination for the children under their protection, than they have to jeopard the lives of these helpless infants by not furnishing them with food or clothing. It is criminal to neglect either, as death may be the consequence; but the failure to provide protection against small-pox seems to be more maliciously wicked than to neglect either food or clothing, as the former may not only cause the death of the child, but may be the means of spreading disease and death among many others; while the evil which arises from the latter, ceases with the death of the victim."

A thoroughly vaccinated person resists all exposure to the infection of small-pox — does not contract even varioloid. Many do not understand this, but regard vaccination as only mitigating the severity of small-pox by changing its form to varioloid. Were the latter true we should have epidemics of varioloid as extensive as the epidemics of small-pox in former times. There are, however, occasional individual exceptions to this rule, but they are exceedingly few.

"Dr. Marson, having the greatest experience perhaps of all writers upon this subject, says of the test of vaccination in preventing small-pox: 'For thirty years we have revaccinated all the nurses and servants who had not had small-pox,

on their coming to live at the small-pox hospital, and not one of them has contracted small-pox during their stay here.'''*

But it is unnecessary to multiply the illustrations. Those who desire to study the subject can find trusty records and statistics to prove the marvelous protective power of vaccination. In vaccination and revaccination all may be safely fortified against one of the deadliest foes to mankind.

* Public Health: Reports and Papers of the American Public Health Association, vol. ix, p. 284.

THE PRESENT POSITION OF THE MILK-SUPPLY PROBLEM FROM THE PUBLIC HEALTH STAND-POINT, AND SOME PRACTICAL METHODS FOR SECURING SAFE PUBLIC SUPPLIES.*

BY PETER H. BRYCE, M. A., M. D., SECRETARY PROVINCIAL BOARD OF HEALTH OF ONTARIO, TORONTO, ONT.

GENTLEMEN, — During the interval since our last meeting I have been requested to introduce for discussion a paper on “Public Milk-Supplies.” In order to properly lay before the association a subject so broad in its practical bearings and so replete with important and interesting details, a paper greatly extending the limits of time allowed for any single subject would be necessary. I shall, therefore, deal briefly with the first part of my subject, in order that I may discuss at greater length those numerous details with which every executive officer of health ought to be familiar.

1. *The Use of Milk as a Food.* — Perhaps nothing will better indicate the importance of guarding this source of food-supply, than to recall the enormous consumption of what from earliest times has been more or less universally used as food by all nations. It is the natural food of all young mammals, whether human-mammal or beast-mammal. “Milk, from the earliest times,” says Dr. Wynter Blythe, “even when its composition was most imperfectly known, has been considered the type of foods.” Statistics may be given to illustrate the extent of the use of milk and milk-products.

In the Province of Ontario, 737 cheese factories were

* Read at the nineteenth annual meeting of the American Public Health Association.

reported in operation in 1888. Calculating from returns made by 557 factories, the following table is given :

No. of factories.	Milk used, lbs.	Cheese made, lbs.	Value.
737	686,369,013	65,299,751	\$6,031,470

In 404 factories, with complete returns, the amount of milk used was 402,599,463 pounds from 150,618 cows. The average number of days in which the factories worked was 155, and the average amount of milk per cow was 2,673 pounds. The total number of patrons was 24,644, or about one eightieth part of the population of the province.

Assuming that two thirds of the population of Ontario is agricultural, we may say that but one tenth of the total production of milk in the province for 155 days, or less than half a year, was utilized for cheese-making. Now, if we multiplied the quantity of milk by ten, and added a half for the number of months remaining, we should have the enormous total of over 10,000,000,000 pounds of milk produced during a single year, or fifteen pounds *per capita per diem*.

Remembering that the great bulk of the cheese-products are exported, and that butter and milk are the chief foods used in Ontario, it is quite probable that this statistic is not greatly overestimated.

The report of the Ontario Bureau of Industries for 1890, states that there were in the province that year only 175,000 farmers, having 777,838 milch cows. We have, however, to add to these the many thousands of cows which are kept for purely milk-supply purposes by people in the cities, towns, and villages.

From statistics, I find that in 1890 the number of cows in the United States is given as 15,952,883, each yielding, on an average, 450 gallons per year, or a total of 6,750,000,000 gallons; and that only five per cent of this total is used as butter and cheese, the balance 95 per cent being used as milk in its natural state. If all were sold at 12 cents per gallon, it would amount to \$810,000,000. In New York State there are 1,552,373 cows.

If, then, this single food-product, having a value so enormous and in itself a perfect food, is to be continued as a universal food, it is apparent that this association cannot engage itself with any single subject with such potentialities for good as this food of the nation, or such possibilities for evil, if we admit that it may possess, or become, the medium for disseminating ills, perchance as numerous as those from Pandora's box.

When we think that in the United States there is one milch cow to every four inhabitants, and that one hundred gallons *per capita* is the amount of milk produced annually, we have some idea, not only of the magnitude of interests involved and of the use of milk and milk-products, but also of the enormous task involved in maintaining these 15,000,000 milch cows in good health, and in protecting the milk, when produced, against pollution. There are in the United States 42,000 (graduated in ten years) physicians, whose duty I assume to be to maintain the people in good health or to heal those who are sick. What number of veterinary physicians is there, I ask, who are devoting their attention to the problem of maintaining these milk-producing animals in health, or in preventing evil results from attending the use of milk, unwholesome at the time of taking from the cow, or in its often strange and eventful history up to the time it reaches the consumer?

When we refer to the infectious diseases alone, which affect the bovine species, we see that they are of a number and character such as to urgently demand close attention and systematic supervision. Thus, they are subject to cancer, tuberculosis (in its several forms of scrofula, phthisis pulmonalis, tabes, tubercular meningitis, glandular tumors, etc.), actinomycosis, anthrax, symptomatic charbon (or black quarter), milk-sickness or "trembles," rinderpest or cattle plague. Texas cattle fever, vaccinia, scarlatina, parturient septicaemia, pyaemia, septicaemia, septic mammitis, glanders, diphtheria and croup, rabies, trichina, taenia, echinococcus, pleuropneumonia, eczema contagiosa (foot and mouth disease), etc.

In this extended list I have selected diseases, every one of

which has been probably known to this continent, and some of them, unfortunately, too well known. As a rule, it is not those *maladies fulminantes*, slaying whole herds in a few weeks, that cause us alarm in the matter of milk-supply, but rather those less acute diseases, which, owing partly to ignorance, partly to carelessness, and not infrequently to culpable cupidity, while not depriving a cow wholly of her milk-producing ability, are disseminated in milk-supplies to an extent proportionate to the numerous opportunities offered and to the vulnerability of the person taking the milk.

The past has legends enough of disease spreading to man, which, with greater care, to-day are not so commonly seen; but we are not wanting in illustrative cases. Thus, during the past summer anthrax appeared in an Ontario county in cattle feeding on bottom lands along a creek below a tannery where South American hides are used. Several animals had died suddenly, from what was supposed to be chemical poisoning due to the polluted water from the tannery. The matter being brought to my notice, I investigated, and suspected anthrax, which was verified in my laboratory. In the meantime another cow sickened. She was milked in the evening, and some one luckily suggested the advisability of not using the milk. It was given to some young pigs. Two died within four days thereafter; the majority recovering, as frequently takes place in pigs. Thus in England and Wales, out of 210 pigs attacked with anthrax in 1890, 117, or over 55 per cent, recovered.

In this outbreak just referred to, a man who, after being warned regarding the nature of the disease, skinned another cow which had died, intending to surreptitiously dispose of the skin, became inoculated, and lay for sometime in a dangerous state.

Of those diseases, however, which, owing to their less acute character, we have most difficulty both in detecting and eradicating, actinomycosis is taking a place prominent in the degree that its nature and prevalence are being recognized. On a single day four head of cattle infected with this disease

were received into the Toronto cattle market, and the disease has by statute this year been placed amongst those scheduled as unfit for human food. Some of the dangers of its spreading and of the difficulties in dealing with it, are admirably set forth in the annual report for 1890 of the health officer for Chicago.

But, as compared with other diseases, the one which must be recognized on every hand as being, *par excellence*, that to which sanitarians, medical health officers, and physicians must devote their special attention, is tuberculosis. That tuberculosis causes one seventh of all the deaths of the human race is stated by reliable statisticians; that it prevails in almost every land is well known; that it is disseminated everywhere on the American continent is equally well established; and that it has greatly increased in prevalence is unfortunately too true. That until recent years it prevailed but little amongst American cattle is probable; but that it has increased, as animals improved by in-and-in breeding have been imported for stock purposes, is well known; and that it has been rapidly developed by the growth of dairying for the supply of milk to the enormously increased populations of our American cities has now become a well authenticated fact. These facts are sufficient to cause us to pay some special attention to the more prominent points of interest associated with the disease in milch cows.

In 1890, of all the cattle slaughtered in Berlin, 4.5 per cent were tuberculous; while in Upper Silesia, 9.5 per cent of all slaughtered in a single abattoir were tuberculous. Bitter affirms that, while statistics are not extant, there are, he has reason to believe, at least 10 per cent of dairy cattle tuberculous in cities and their environs. No precise statistics have anywhere been tabulated regarding the prevalence of tuberculosis in dairy cattle in British cities, but that it is much too prevalent may be gathered from evidence such as that published by the local government board's report regarding tuberculous meat in Glasgow. The reason for the absence of such reports is that tuberculosis is not included in the list of contagious

diseases in the (Animals) Contagious Diseases Acts of England and Wales, and animals affected with it can only be got at by the by-laws regarding unwholesome meat and milk. In the report of the Veterinary Department of the English Board of Agriculture for 1890, the following occurs in a paragraph referring to tuberculosis being placed on the list of contagious diseases in animals: "Recently the subject has been brought to the notice of stock owners and dealers in a very pronounced way, in consequence of the very frequent seizure by sanitary authorities of carcasses of animals, which, after being sold in open market as healthy cattle in fine condition, had been found affected on post-mortem examination, and had been confiscated without any compensation to the purchaser, who had acted throughout in good faith, as also had the seller and all other persons concerned in the transaction.

"That the sufferer should appeal to the government for compensation was natural, since they asserted that, (1) The fact that many animals apparently healthy show after slaughter tuberculous disease, and, (2) That there is no ground for seizure and destruction of meat which was perfectly healthy to the eye of the meat inspectors, merely because some of the internal organs were affected with tubercles."

A royal commission has been the outcome of these representations, which is inquiring into the degree of infectiveness of the meat of tuberculous animals.

The same report gives the results of some experiments carried on during several past years to determine this important point. The following facts are granted, viz. :

(a) Lower animals may be infected with tubercle derived from the human subject.

(b) Bovine tuberculosis is communicable to other animals by inoculation, and by feeding with tuberculous material.

(c) A peculiar character of bovine tubercle, "grapy" form (*perlsucht*), does not appear in any animals as the result of experiments.

(d) The inference that man is susceptible to infection from the lower animals remains, and must always remain, based on analogy, direct experimental proof being unattainable.

The experiments undertaken were with the intention of determining whether meat of tuberculous origin, yet not containing any obvious tubercles or any tubercle bacilli detectable in microscopic examination, is capable of producing tubercle.

The experiments were carried on in three sets. In the first series, where seven rabbits and six guinea-pigs were fed upon muscle from undoubted cases of tuberculosis in cattle, post-mortem examinations, all within a few weeks (three or four months), showed that ten of these animals, or 77 per cent, were affected with tuberculosis; while five animals fed on milk from cases of undoubted tuberculosis, or on material other than milk from doubtful cases, were all, without exception, found to be in a normal and healthy condition.

In the second series, nine guinea-pigs were fed with tuberculous muscle mixed with oats and bran for five days. The feeding took place in the middle of December, 1890. On January 2, one animal was taken from each of the three cages and examined post-mortem, and not a trace of tubercle was found in any. From the 3d of January to the 10th, the remaining six were fed with pressed meat juice added to bran and oats; thereafter, on ordinary diet. On January 14, one died, and was found to have tubercular disease. On the 20th of January, another died with pronounced disease of intestines. On January 22, a third was found dead with extensive disease of lungs, liver, spleen. All of the remaining animals of the series showed pronounced tubercular disease, especially of organs of the alimentary canal. The two central animals, fed on bran and oats only, were killed early in February, and were found perfectly healthy.

Here the percentage of well marked cases of tuberculosis in animals fed on muscle or juice was 75 per cent.

A third series of experiments, carried on in Edinburgh, in the laboratory of Professor McFadyean, were negative in their results, and comparable with similar experiments by Nocard and Bollinger. Professor Brown remarks, regarding these three sets of experiments: "On the other hand, the first and

second series of experiments leave us no room for doubt that meat taken from tuberculous cattle, the tubercle being trimmed off without any special precautions, exactly as is done by the butcher, is capable of causing the disease in animals which partake of it in a raw state. The further question of the degree of cooking which is necessary to destroy the infective character of the meat, has yet to be determined by experiment."

I have made this reference to diseased meat, since it is intimately related in its bearings to the question of the power of milk to transmit the germs of disease, as tuberculosis.

From Koch's first experiments, and from those of numerous investigators since, it seems to have been proven beyond doubt that tubercular nodules in the udder are a source by which the bacilli of tuberculosis are directly transmitted with the milk. This point seems to be settled as definitely, as that flesh with tuberculous matter in it is infectious. That this danger is a serious one, is seen from German statistics already quoted, and from other data where, as in Edinburgh, of 660 cows, 37 had tubercular mammitis. How far milk from tuberculous cows with no tuberculous nodules of the udder is tuberculous (as far as clinical examination goes), is a question of even greater importance than that of whether or not meat with no tubercles is capable of transmitting the disease.

Some recent experiments in Denmark seem to show that the danger, at this stage, of transmitting tuberculosis is not very great. The question, however, of at what stage the milk of a cow affected with progressive tuberculosis becomes dangerous, or infected with bacilli, is one of such paramount importance that it is one which we may very properly consider. The following are the most recent conclusions on the subject, based upon actual experiments:

The report of the recent Paris congress on tuberculosis does not seem to have added any special light on the subject; but the experiments carried on by Dr. Ernst, of Harvard university, seem to have been so extended and thorough as

to leave no doubt as to the dangers from this source. The report states that veterinarians give instances of the infection of calves from tuberculous mothers; and that this is true is undoubtedly shown from M. Vignal's experiments, as related at the Paris congress, from which the conclusion is drawn that it is transmitted from mother to fœtus during pregnancy only in extremely rare cases.

In Dr. Stone's experiments, conducted under Dr. Ernst, 126 separate microscopic examinations of milk from affected cows were made, and in sixteen instances the tubercle bacillus was found, or in 13 per cent of cases. The report further says:

“By inoculation of the same milk in rabbits and guinea-pigs, in seventy-four inoculations we produced six cases of tuberculosis, the inoculation being from only one to three drops of milk. This means in 8 per cent of rabbits and in over 13 per cent of guinea-pigs.

“From feeding experiments with twelve pigs, nearly 50 per cent became tuberculous, and of twenty-three calves, eight, or 23 per cent, became tuberculous.”

That the milk in public supplies may be dangerous has been shown by tubercle bacilli being discovered in mixed milk in Boston, and also from Foster's experiments, who found that tubercle bacilli may exist in milk for at least ten days.

How much value can be placed upon these experiments, viewed from the practical standpoint, can not yet be determined; but it is fair to say that if an inoculation of milk is made with many forms of bacteria, they seem to find milk to be a very good culture medium. That all, however, is not known on this subject must be confessed, and that the fluid tissues of the body and their secretions exert in their normal condition certain protective influences against the invasion of disease has been established beyond doubt.

Many are doubtless familiar with the results of the remarkable experiments which have been carried on during the last three years, growing out of Metchnikoff's phagocyte theory.

From these it becomes evident that there is another element in the immunity of certain animals against certain diseases, while the same animals will succumb to other diseases. That, for instance, blood serum exerts a certain bactericidal influence is known by foreign researches, as also by those of Professor Prudden. At this point comes the difficulty of deciding what constituent of blood serum possesses the power; and hence it has come about that certain nitrogen compounds have been extracted from the serum, which, when inoculated into animals, produce immunity in certain directions. These compounds have been called tox-albumins, or defensive proteids; and the theory of their action in creating immunity has been stated by Hankin as follows.

“Immunity, whether natural or acquired, is due to the presence of substances which are formed by the tissues of the animals rather than by those of the microbe, and which have the power of destroying either the microbe against which immunity is possessed, or the products on which their pathogenic action depends.”

The important influence of these recent studies on our views with regard to the transmissibility of bacterial diseases cannot be overlooked, and doubtless are of much value; but there are two conditions, which, in connection with our present subject, must necessarily exert a potent influence on the normal quality of cows' milk.

The first of these is the healthy condition of the cow at the time of milking, and the second is the preservation of milk in a condition as nearly akin to its normal condition as possible. Without argument, it may be assumed that cows' milk cannot be normally secreted from tissues that are not in a normal condition. Experience has further shown that by injections into the blood, of chloroform, atropine, etc., alterations take place in the blood by which immunity is removed. For instance, Klein produced anthrax in rats after having administered chloroform, it acting as a depressant. Some of these blood changes are readily observable, and, as would be expected, such changes show themselves by alterations in

milk — a normal secretion of the tissues. Take the disease of tuberculosis in cattle; after both feeding and inoculation experiments, it is seen that a daily rise of temperature in rabbits, pigs, calves, etc., takes place of 3 or 4 degrees F. Similarly, although no tubercles of the udder may be present, a daily rise of temperature tends to take place. This has been known in advanced cases to produce a stringy condition of milk and precipitate on standing.

Now these facts may be taken advantage of in a practical way in our efforts to determine what constitutes a normal milk. Thus we are brought naturally to the study of milk as a physiological product. Whether viewed simply as a constituent directly of the blood itself, obtained by osmosis, or as a secretion elaborated in the cells of the milk glands, it is found to have in a normal state certain very well defined relations existing between its various constituents. All know the normal constituents in milk to be as generally stated, fat, and solids not fat, which latter are composed of sugar, proteids, and ash. For many years chemists, and of recent years agriculturists, have been intently engaged in determining, from the commercial standpoint, the relative proportions of these, and especially of the so called butter fat. For our present purpose it suffices to know that different breeds, and different animals of different breeds, give milks which are normal, and yet whose constituents vary notably within certain very well defined limits. Knowing these facts, chemists and others have argued that there is really no such thing as a normal milk standard possible; but these have argued from a limited knowledge of the facts, or, more probably, limited opportunities for drawing general conclusions. Very recently it has been found that while the butter fat in different animals may notably vary, yet if the cow is known to be healthy, and no abstraction of fat nor addition of water has taken place, the several constituents of milk bear to one another a tolerably definite relationship. Contrary to the old idea that milk high in cream or butter fat would show a lessened amount of other constituents, it is now known that with the percentage of

butter fat high the other solids are present in a proportionately larger amount. Thus, Professor Cochrane, analyst to the Pennsylvania board of agriculture, gives the following results at 60 degrees F. :

No.	Sp. gr.	Fat.*	Total solids.	Solids not fat.
1	1,029.6	3.38	11.33	7.95
2	1,030	3.62	11.93	8.31
3	1,029.3	3.63	11.63	8.02
4	1,033	5.70	15.64	9.94
5	1,034	5.35	14.87	9.52
6	1,034	5.19	14.70	9.51
7	1,034	5.88	15.48	9.60
8	1,034	5.05	15.69	9.64
9	1,034.3	5.95	15.60	9.55
10	1,035.2	5.70	15.60	9.90

Hence, it is very properly concluded that the lactometer, or lactodensimeter, is an instrument of much value in testing a milk from the standpoint of adulteration. Thus, a milk of low specific gravity and low in solid constituents would indicate the addition of water; a milk of high specific gravity and a low percentage of fat is probably skimmed; and a milk having a low specific and yet a high percentage of fat indicates either a very good milk watered, or an unfair sample taken from the creamy portion of the milk.

From many thousand analyses made by Dr. Paul Veith, F. C. S., analyst for the Aylesbury dairy, London, England, during eight years, broad general conclusions have been drawn. During those eight years he analyzed 84,746 samples of milk, and has preserved records of great value, from which the following are some of the more important deductions: He found that the non-fatty solids are the most constant factors in milk, having the following relations to one another :

Total non-fatty solids. $\left\{ \begin{array}{l} \frac{6}{12} \dots \text{the milk sugar,} \\ \frac{1}{12} \dots \text{mineral matter (ash),} \\ \frac{5}{12} \dots \text{the nitrogenous matter } (\frac{2}{3} \text{ of this} \\ \text{being caseine).} \end{array} \right.$

* Per cent.

He likewise found that milk from cows fed with the same foods shows a remarkable constancy of specific gravity, rarely falling outside the limits of 1,030 to 1,034.

As regards quantity, he found that the morning milking stands in relation to the evening as 100 to 72, accounted for, he thinks, by the fact of the cows having before them water during the night, and no food after the evening meal. The great increase shows a difference in quality, but not of an amount to offset the difference in quantity. Thus, analyses made on eleven different days showed in one cow (a type of the others) that the amount of pounds of milk-yield averaged

14.4 pounds at morning milking,
10.2 pounds at evening milking.

Fat solids. { 3.5 per cent at morning milking,
 { 4.1 per cent at evening milking.

Non-fatty { 9.13 per cent at morning milking,
solids. { 9.32 per cent at evening milking.

That these results are constant, may be seen from similar experiments made at the Agricultural college, Guelph, Ont. The following are the results of the average of one week's examination, by Prof. C. C. James, of the milk of six cows by the Babcock tester to show butter fat:

Cow.	Morning milk.	Evening milk.
No. 1	3.25 per cent.	3.96 per cent.
2	2.76 "	4.00 "
3	3.18 "	4.33 "
4	3.42 "	4.45 "
5	2.75 "	4.18 "
6	2.63 "	3.70 "

Dr. Veith further found that the quality of milk reaches its height in November, while in the spring months the poorest milk is received, with another depression in July. The returns were gathered from thirty to fifty farms, and fresh

milch cows are obtained at all seasons of the year. It would therefore appear that at these seasons the variations depend upon climatic changes, since the amount and kind of food consumed on the same farms are much the same throughout. There can be no doubt that an influence of an important nature is exerted by weather changes. Thus, a sudden fall in the barometer, and a raw easterly wind, will in twenty-four hours lessen the yield of one hundred cows by a number of gallons; and a sudden accession of severe cold will, for a day or two, notably lessen the milk-flow. Great heat in the summer similarly affects the milk-supply. But the most notable differences depend upon the kind, amount, and methods of feeding. The physiological factor, the perfect or imperfect metabolism of digested products, — in other words, the character of the soluble constituents of food entering the stomach and the digestibility of other foods, — forms the most potent factor, under ordinary conditions, in influencing the amount and quality of milk. Ensilage of any kind will give to milk its special flavor, and produce a certain quality as regards richness and permanency; so also will such foods as bran and various ground grains; and the same is the case with brewers' grains, fresh or fermented; refuse starch-products, and so on to distillery slops.

Now while there is no doubt that milch cattle become habituated to certain foods unnatural to them, yet the experience of close observers shows that milk always has a physiological normal constitution dependent upon the perfect metabolism of wholesome grains and grasses, and that other foods do produce in some degree abnormal products. All dairy-men are aware of how leeks in spring-time flavor the milk, and dairymen are very well aware that so simple a thing as turning cows from permanent pasture into a clover-field will produce so notable a taste as to cause complaints of something having gone wrong in the milk.

This subject opens up a wide field for investigation, which as yet has received but little attention, even from the sanitary standpoint. From more or less general experience, the

impression exists that the milk of cows fed with refuse grains and ensilage, all including some starch or sugar more or less altered by the alcoholic or acetic ferments, has not the keeping properties of the milk of cows fed with hard grains and grasses. The diarrheal troubles in children have not infrequently been attributed to this cause. I am not aware of any extended experiments going to show that such milk contains an excess of sugar, and, as already mentioned, Dr Veith states from his many analyses that sugar maintains its average proportion of one half to the non-fatty solids of milk, and that these constituents maintain throughout a remarkable relative constancy. On many of the farms of the Aylesbury Company, brewers' grains are fed, but it may very well be that in the English climate fermentative changes are ordinarily slower than in the warm weather of this country.

This point naturally brings me to speak of the acidity of milk, and its relations to normal physiological processes. We are aware that milk is spoken of commonly as being a practically neutral secretion, giving slight reaction with both red and blue litmus—in other words, being amphoteric. In reality, however, normal milk, owing it was thought to a certain amount of carbonic acid dissolved in it, ought to be considered as acid. Dr. Wynter Blythe by experiment has shown that milk contains, in a litre of fresh warm milk, 1.83 c. c. of gases—carbon dioxide, .06 c. c. or 3.27 per cent; nitrogen, 1.42 c. c. or 77.60 per cent; oxygen, 35 c. c. or 19.13 per cent; and that standing increases its carbonic acid by a certain amount of oxygen absorbed.

It is questionable, however, whether milk does really contain when freshly milked any appreciable amount of carbonic acid, since by experiments carried on in the laboratory of the provincial board of Ontario it has been found that the acid reaction found in milk just drawn does not alter on boiling, by which process carbonic acid would be driven off if present as a free acid. It has further been found that milk, if rapidly aerated and cooled, does not increase in its acid reaction.

The following results of experiments carried on in a large

dairy near Toronto by my laboratory assistant, Mr. J. J. McKenzie, will be found of great interest in determining this point:

The standard normal solution of caustic soda (40 grammes to 1 litre of water) was prepared, and added to milk just drawn from the cows into clean sterilized flasks. The point of acidity was delicately determined by pheno-phthalein having been previously added to the milk. It will be seen that the acidity of milk may be represented as having an average of 1.1 in a series of individual milks, or in the mixed milk from a herd of one hundred cows; that is, 1.1 cubic centimetres of normal caustic soda solution was necessary to neutralize the acidity present. As these cows had been fed month after month on fresh cut hay mixed with bran and pea-meal, and on the grass for a few hours each day, it may be said that the food was the best possible for determining what is the normal physiological acidity of milk. From the fact that carbonic acid does not seem to be a factor in this acidity, but that it depends upon some acid basic salts (probably phosphates) present, it will appear that in the determination of the acidity of milk we have a method of much value in not only testing the effects of different foods on milk, but in estimating the changes which go on in milk under the influence of bacterial ferments of various kinds.

At this point I enter upon a part of our subject so interesting and yet so intricate, that I confess to having some fears as to the propriety of my attempting to deal with it; and yet, I am convinced that until the biological factor in the study of milk has been followed with the same assiduity as has the chemical, we are not likely to greatly increase our present knowledge on the subject.

Starting then with the facts just related regarding the acidity of milk, I believe it will be found that, under ordinary conditions, the determination of the acidity of any milk will serve as a measure of the degree of bacterial infection which has taken place, and of its fitness for use as a food. For instance, in the experiments which I have recently been

directing, a milk, which showed 1.1 degrees of acidity both at milking and after aerating and cooling by a method adopted at a large dairy near Toronto, was placed in quart bottles, which had been well washed in a warm soda solution and afterwards rinsed in clean water and drained and aired for some hours, and thereafter placed in a refrigerator having a temperature of 40 to 45 degrees F. These bottles were covered with a flat metal cap and allowed to stand. After five days their acidity was tested, when it was found to have remained unchanged from the normal 1.1 degrees, and the milk, to the taste, seemed in every way normal. Now from this it may fairly be concluded that while the milk must have been infected to some extent with the lactic acid ferment from contact with the sides of the milk pails, cans, and bottles, yet the treatment of the milk by aeration, and its subsequent retention at a low temperature, served to delay for the length of time stated the multiplication of the bacillus lacticus, or, indeed, of any other microbe whose multiplication produces an acid reaction.

These facts lead us to inquire whether the care exercised in drawing the milk, in cleansing cans, bottles, etc., may not so minimize the amount of bacterial infection as to make it possible for the defensive proteids, or tox-albumins, which I assume to be present in milk, to so exercise their bactericidal influence as to actually destroy the greater part of the bacilli lactici necessarily introduced.

Fokker has shown that there is in fresh milk some compound present which actually does exert this destructive influence. From an intimate knowledge and observation for several years of the working of a large dairy and of the keeping qualities of milk, I have for some time been of the opinion that what are known as the animal odors of milk exert an important influence, both directly on the wholesomeness of milk and upon its keeping qualities. It is well known that milk, taken from a healthy cow at night and placed warm in a small pail and covered, will retain flavors to a disagreeable extent, and emit an odor, often very disagreeable. It has,

hitherto, I believe, not been seriously attempted to isolate these volatile organic compounds, which by aeration and chilling are so readily caused to disappear, although Wynter Blythe in his examination of the gases of milk might naturally have been expected to recognize their presence. He, however, seems to have found only those gases of which a table of amounts has already been given. That they are highly organized nitrogenous compounds I readily believe, and that in themselves they may in some instances be noxious, I have thought possible. For instance, we are aware that nursing mothers, under extreme nervous excitement of a depressing character, may secrete milk which will cause convulsions in the child; while I have known the milk of a nervous Jersey cow, tethered during the day in a corner of a city park where she was worried by boys and dogs, to secrete a milk which almost invariably was altered between night and morning so as to be totally unfit for use. Such facts remind us of the curious "Gemeingefühl" theory of Jaeger, whereby, under pleasing mental states or the opposite, volatile odors are produced in the body; in the one case, stimulating the heart to full vigorous pulsations; and in the other, depressing notably the heart's action, and so affecting nutrition.

Whatever be the cause of the conditions to which we refer, we learn from those engaged professionally in dairying that there are many variations in the minor constituents of milk, which seem to notably affect its coagulation, etc. Thus, this albuminous substance seems to vary, notably in amount, according to the age of the milk, and doubtless according to the healthy character of the mucous membrane of the udder and teats.

After making all allowance for these minor variations in the constitution of milk as affecting its wholesomeness as a food, it must be confessed, however, that the care of the milk, in its handling from the time of taking it from the cow until it is consumed, is by far the most important element in the question of its fitness for food. Milk taken under the best ordinary care in stables is by no means as free from bacteria

as it might be; but as too commonly taken, it is absolutely laden.

The following is the result of a bacterial analysis of milk, taken by my laboratory assistant, in a large stable, where the milk is supposed to be handled with unusual care as regards cleanliness: Gelatine plate cultures were poured, one half c. c. of milk being added for each culture. After three days, maintained at the laboratory temperature of 66–70 degrees F., the various plates giving the following results:

ANALYSIS OF MILK (BACTERIOLOGICAL) AT DIFFERENT STAGES OF TREATMENT.

Average of two samples.

I. Direct from cow; no precautions except milk received into sterilized test tube, 15 microbes per c. c.

II. Pail in stable receiving milk from different cows; milk strained through a cloth, 720 per c. c.

III. Milk from cooling apparatus after cooling, 884 per c. c.

IV. Milk from bottles immediately after filling, 1,640 per c. c.

As regards normal milk acidity, —

Oct. 7. Six cows gave the following: .95, 1.06, 1.27, 1.12, 1.20, 1.09 — average, 1.11. Kept in all day; 1.11 c. c. of normal soda required to neutralize. Average of mixed milk of 100 cows on cooling, 1.11

Oct. 8. Cow No. 2 of above series, 1.10; No. 3 (back lamed), 1.50; No. 4, 1.00; No. 5, 1.01. Out all day pleasant days. Mixed milk, 1.10. After standing in refrigerator, for four days at 40–45 degrees F., 1.10, 1.50, 1.00, 1.00 — average, 1.11. All milk aerated, but not otherwise sterilized.

These results are remarkable, and illustrate Bitter's (of Breslau) conclusions that air contamination is the merest incident as compared with that due to the hands of milkers, strainers, and other various utensils used. It is not then difficult to understand how, with a slow process of cooling from

100 degrees F. down to air temperature, very favorable conditions have been present for the multiplication of germs.

It is curious to note how many explanations other than the bacteriological one are given for milk changes by professors of dairying. Professor Arnold illustrated in his work a peculiarity, which, during the warm weather of a particular summer, occurred in Rochester milk, by which, after the driving of milk in wagons a few miles from the country, it was found to be coagulated while showing no marked acid reaction. This is now known to be due to certain bacterial forms different from the common acid producing forms.

Speaking of the bacteria of milk, much good work has been recently done on the subject, and some very interesting results have been obtained. Of these, those carried out by H. W. Conn, Ph. D., at the Storrs experiment station, Connecticut, are of much interest. He has, as might be expected, found almost innumerable bacterial forms in milk; but there are principally three classes, distinguished by the effects of their action on the milk. These are, briefly, — (1) The bacillus *acidi lactici*, and perhaps allied forms, which change the sugar into lactic acid and carbonic acid, and coagulate caseine into a hard mass, are aerobic, and do not liquify gelatine. (2) The second class curdle the milk without rendering it acid. These forms liquify gelatine, produce spores, and are anaerobic largely. The curd formed by these is soft and jelly-like. (3) A third class, as *oidium lactici*, seem to be common in milk, and yet produce no marked coagulative effects or acid reactions.

That, however, the various decomposition changes which occur in milk, cheese, etc., are due to bacterial action, may be realized from the fact that milks kept under various conditions have shown bacteria ranging in numbers from 300 to 6,000,000 per c. c. How they may multiply is seen by the single illustration that milk which had been kept for several days in a cool place and then showed 10,000 bacteria per c. c. was afterwards allowed to stand in a warm room some six hours, and during this time the bacteria increased from 10,000 to 1,000,000 per c. c.

Now I have intimated enough to fully set forth the fact that milk sterile on milking becomes at once contaminated under ordinary circumstances; but that the rapid development of sourness really depends upon the subsequent conditions.

Fokker, of Groningen (Holland), has given figures showing that for a short time milk seems to resist bacterial growth. For instance, he added a measure of bacterial broth to milk, and found that—

1 c. c. of milk then contained 120 bacteria;

1 c. c. of milk contained after 24 hours 10 bacteria;

1 c. c. “ “ “ 48 “ 2,200 bacteria;

1 c. c. “ “ “ 72 “ innumerable bacteria.

He further indicated, what Duclaux and others had pointed out, that the resisting power of milk is lessened by sterilization, since, if subsequently inoculated, he found it invariably coagulated in twenty-four hours.

But aside from all these special conditions there stand out the broad facts, within common experience, that good milk taken carefully does form, under ordinary conditions, an admirable culture medium for various bacteria, but especially for the common sour milk *bacillus lacticus*. I give but one of our experiments: Four sterilized tubes were filled with milk and plugged with wool; two lots being directly from the teats of the cows after careful washing, and two from the mixed milk after aeration and cooling. All were exposed to the laboratory temperature, and at the end of thirty hours all were coagulated, and showed practically the same degree of acidity measured by the normal alkaline solution.

From the results of the plate cultures already given, we have seen that the milk at these two stages showed a very notable difference in the number of bacteria present; yet in practice this amounted to very little, so long as any inoculation at all had taken place and the temperature was favorable for rapid bacterial growth. On the other hand, as might be supposed, there are degrees of purity as regards bacterial contamination; and a milk, if carefully taken, is much more likely to remain sweet if kept cool than if much contaminated.

Bitter has found that milk in sterilized and unsterilized cans varies greatly in keeping properties after Pasteurization. Thus:

Sterilized cans.	Unsterilized cans.	Temperature.
46 hours.	24 hours.	23 degrees C.
96 "	48 "	15 "
72 "	24 "	23 "
130 "	65 "	14 "
86 "	48 "	19 "
104 "	66 "	14 "

But that temperature is the main factor, has similarly been shown by Bitter in his experiments with Pasteurized milk. Thus when heated to 68 degrees C. and thereafter chilled, the following results were obtained:

At 30° C. milk remained good 6-8 hrs. longer than un-Pasteurized milk.

" 25°	" "	" 10'	" "	" "	" "
" 23°	" "	" 20'	" "	" "	" "
" 14°-16°	" "	" 50'-70'	" "	" "	" "

Bitter has determined after numerous experiments to make an arbitrary standard of goodness of milk by counting the number of bacteria in the sample. Milk, according to this scale, is good if the number of bacteria falls under 50,000 per c. c. Above this it becomes doubtfully good, and when 2,000,000 per c. c. are present it is absolutely destroyed. He concludes that, with regard to the preservation of milk, Pasteurization at 68 to 75 degrees C. is safe at ordinary temperatures; that in hot summer weather it will keep at least thirty hours longer; and that at this temperature the taste and flavor are not altered and cream production is not affected.

Manifestly, however, with ordinary methods, as we find them, in the care of milk, temperature, of all factors, has the most important bearing on the keeping of milk. I cannot do better than conclude these studies with a quotation from a recent critique, by M. Duclaux, "Sur la stérilisation du lait." He says:

“It seems to me that in place of always marching forward in this direction, it would be useful to retrace our steps, and ask ourselves if it would not serve better if we should avoid all necessity for heating, in preventing absolutely the introduction of all hurtful germs into the milk. In the conference, held on the 7th of June, 1889, in the Trocadéro, during the Universal Exposition, I said, ‘that milk, properly taken, in a stable properly kept, by a milker who had first washed his hands and the teats of the cow, would not coagulate more quickly than milk taken without care, and having carbonate of soda added to it to mask the defects of cleanliness.’ * * * ‘It seems to me that in this direction lies progress, at least for milks destined for rapid consumption, and not from the side of the multiplication, or making perfect, of apparatus for Pasteurization.’”

Summing up, then, some of the practical conclusions to be derived from our studies, I would briefly formulate the following, as methods likely to conduce to an improvement in our public milk supplies.

1. After intelligent dairymen have selected their cows, it is especially desirable that a system of periodic veterinary inspection, in addition to the dairymen’s inspection, be exercised, under the municipal health department, of all milch cows supplying milk to the municipality.

2. From what has already been said it is manifest that strong views should be held and taught regarding the nature and quality of the food of milch cows, whose milk is intended for public supplies. Not only has it a direct influence on the general health of the cow, but the condition of the milk at the time of taking, and also its keeping qualities, are undoubtedly in no small degree dependent on the character of the food supply. All decomposed foods, as those which are liable to undergo fermentation, should be wholly avoided. As already mentioned, the best foods are the well ripened grains and grasses, well cured and free from weeds, fed in such a manner as to supply the various milk constituents in proper amounts, and in such a way as to promote easy digestion and proper assimilation.

3. The stables of the cows are manifestly a point of great importance. Too often, dark, damp, ill-ventilated, and crowded pens have been the home of this chief of our food supplies. It is quite possible, as hundreds of dairymen and farmers have shown on this continent as on the old, to keep, even on a large scale, a dairy stable free from the ordinary disagreeable stable odors, to give the cows abundant ventilation, and to so conduct the feeding, that cows, taken from the ordinary barn-yard feeding of the farmers, will readily improve in general appearance, and increase greatly in milk and in flesh. The water supply to the cows is of equal importance. Too often, the barn-yard pool, or sewage-tainted creek, or cheese-factory drainage, are the sources from which the dairy cattle drink; and not even to mention the more delicate physiological effects of such water, cheese makers tell us that they can distinctly note the gross effects of cows drinking filthy waters by the degraded quality of the milk which, at times, comes to their factories.

4. The care of the milk at the time of, and subsequent to, taking, is, however, of all points at once the most difficult of control and the most necessary to supplying a wholesome milk. We have pointed out wherein the difficulties lie, and would only say, as Duclaux has said, "Cleanliness everywhere is the *sine qua non*." That it means almost a revolution amongst farmers and dairymen, as regards their methods, is apparent; but as Duclaux neatly says, "Producers will quickly find the means (of cleanliness and a reform in their methods) if consumers wish strongly. When people demand clean milk, they will have it. They will always have to boil milk before using, when they are not sure of the condition of the cow that furnished it; but the question will not the less have taken a great step in advance when milkmen and milkmaids know all that is implied in cleanliness." Hence, the sterilizing of the cow's teats by washing, the sterilizing of all cans and bottles by steam or dry heat, and the boiling of all cloth strainers will be necessary. Aeration and rapid cooling are of enormous influence in delaying, as we have seen,

the multiplication of bacteria, and I am convinced that the placing of milk in a refrigerator over night, at 40-45 degrees F., and allowing the cream to rise in well stoppered bottles, conduce together to the greatly increased permanency of the normal milk condition.

5. The delivery of the milk is similarly of prime importance. If placed to cool in sterilized bottles, at a low temperature, the layer of cream tends to prevent agitation in the bottles, and where the bottles are packed at the same time in accurately fitting compartment boxes, these exactly fitting into wagons specially designed for them, the agitation or disturbance of the milk in transit will be reduced to a minimum, and the introduction of oxygen is lessened. The numerous details in this regard need not be further referred to here.

6. Finally, when the milk has reached the consumer, it must be placed in a refrigerator, or promptly consumed. If in the former, I have known milk in summer weather to retain its sweetness for three or four days when precautions such as I have spoken of are present.

7. In case the Pasteurization of milk is introduced into practice by dairymen, it is necessary that the same care should be exercised in keeping milk cool, after heating to 68 or 70 degrees F., as is necessary under ordinary treatment.

In conclusion, I may say that it is my opinion, after very carefully studying the processes and results of a large dairy for four years, that, with carefully selected and inspected cows, as regards freedom from disease, notably tuberculosis, the taking of milk with care as to cleanliness in the particulars already given, to aerating the milk to remove the volatile animal gases, to bottling in sterilized and well stoppered bottles, and the placing them promptly thereafter in cold storage, at 40-45 degrees F., with careful handling in delivery, will be found to present so many practical advantages, both as regards the tastes of the consumer and the convenience of the dairyman, that sterilization in other respects will not be likely to be found necessary, or find general adoption.

WATER SUPPLY AND PUBLIC HEALTH.*

BY ALLEN HAZEN, LAWRENCE, MASS.

During the last few years, there has been accumulating an overwhelming amount of evidence that typhoid fever is often transmitted from one person to another by drinking-water. I need not refer to the experience of foreign cities, but only to mention epidemics, during the past year alone, at Albany, Wheeling, Duluth, Lowell, and Lawrence, besides many others of less extent. In a part of these cases, at least, most thorough investigations have been made, showing beyond question that the excessive death-rates were due to the pollution of the public water supplies.

Investigations have also been made, both in England and in India, showing that Asiatic cholera is most frequently conveyed by drinking-water, and we have to consider what part our water supplies might take in its propagation in the unfortunate event of its gaining a foot-hold on our shores.

It behooves us, then, to give this subject most careful consideration, with a view to understanding the exact method of transmission, and, if possible, to find measures which will secure relief.

Both typhoid fever and cholera are caused by the growth within the body of particular species of bacteria, which are most frequently taken into the system through the mouth, either with the food or drink, and it is the presence of these particular germs in a water which gives it its power of causing disease. A water may be muddy, or hard, or discolored by organic matter, it may even be sewage-polluted and

* Read at the nineteenth annual meeting of the American Public Health Association.

swarming with germs; but if it does not contain the objectionable species, its use will not cause the diseases in question.

At first sight it would appear that bacterial examination for the hurtful forms should give the true criterion of the character of a water. The difficulty of the search for pathogenic organisms, however, has greatly limited this line of work, and only confirmatory results have thus far been obtained; the bacteria have not been found until after their presence has been indirectly proved by an excessive number of cases of typhoid fever among the users of the water, which could not be ascribed to any other cause. Improved methods are being suggested for the detection of the typhoid bacillus, and it is quite probable that in the future we shall have methods at our disposal, far more satisfactory than those which we have been using.

But when we have a greatly improved method for the detection of the bacillus, how much will it help us? That the fever is due to water supply has been amply proved in numerous cases, by eliminating other possible causes, and by showing that those who drank from one water supply suffered, while their neighbors, with other water, remained free. Now when it is once established that a water supply causes typhoid fever, the number of cases among the consumers of the water is a far more satisfactory index of its condition than any laboratory tests, however perfect. In the case of proposed water supplies not yet introduced, the death-rate test cannot be applied, and we must have recourse to other methods. But supposing it were possible to show absolutely that disease germs were absent from a given river, no proof has been given that they will be absent a month hence, under somewhat changed conditions of temperature, volume of water, etc. The Merrimack river water often produces typhoid fever among those who drink it, but not always; there are times when its influence is scarcely perceptible; at other times it is capable of causing an epidemic. Aside from any analytical imperfections, the bacterial methods cannot guarantee the future of a water from its present condition, and as it is the future in

which we are mainly interested, we must look for other sources of information.

So far as we know, the germs of communicable disease are absent from unpolluted waters; they are introduced only by sewage. Waters which are absolutely free from the product of human life are, in general, safe for drinking. It is our first problem, then, to determine whether a water is sewage-polluted. This is done by inspection of the water-shed, or by chemical analysis, or by both. With surface waters, inspection of the water-shed is usually of the first importance. The sight of Lowell's sewers is better proof of the contamination of Lawrence water supply than any amount of chemical or bacterial analysis. In this case, analysis is useful in measuring the amount of pollution, and in showing any purification which may have taken place. In the case of ground waters, inspection of the water-shed is often impossible, because its exact location is unknown. In these cases, thanks to the great progress which has been made in the methods of examination, we may depend with confidence upon chemical analysis to show us the past history of a water. The analysis is especially satisfactory when the normal chlorine is accurately known. The normal nitrate is also useful in this connection. In Massachusetts, strictly unpolluted ground waters rarely have as much as 0.02 part nitrogen or nitrate per hundred thousand, and as this does not depend upon proximity to the ocean, it can be used where the normal chlorine is unknown.

If we can show that a water is absolutely free from sewage, we may safely infer the absence of pathogenic germs, although, as yet, too little is known of the diarrhea and other complaints which have been sometimes attributed to water quite free from sewage. The adaptability to public use of a sewage-free water depends mainly upon its physical characteristics—turbidity, color, odor, taste, and hardness. On these points, the public is a competent judge of what is required; the chemist makes accurate comparisons between different waters, but it is for the consumers to say what is satisfactory to them.

If we find that a water-shed is inhabited, or if the chlorine

and nitrates are above the normal, then we must conclude that the water is polluted, and other data must be obtained before we can decide upon its quality. The possibility of securing water entirely free from sewage contamination is rapidly becoming less. With increasing population, water-sheds of sufficient size are fast becoming settled, and in those portions of the country where the entire surface of the land is suited to human occupation, and especially in the neighborhood of large cities, their retention for water supply is practically impossible.

We are thus forced to face the problem of so managing an inhabited water-shed, and the water derived from it, as to secure a water supply which, although it has been polluted, is without danger to the public health.

The question now to be considered is, whether pathogenic germs could survive from the point of contamination to the point of consumption. It is not enough to show that they are not now present in the water; it must also be shown that they could not be present under any possible, or at least probable, conditions. It is our greatest problem, to determine through what conditions pathogenic germs can survive.

In its simplest form, we have the case of sewers emptying directly into a water course which is used for water supply. There has been a theory current that rivers have a power of purifying themselves, and that when the volume of sewage is not too large, in comparison with that of the water into which it flows, the great dilution and the oxidizing action of the air will soon restore the river to its original purity. Lawrence, Lowell, Albany, and other cities, knowing that their water supplies were polluted, have depended upon these agencies to purify them, and they have depended in vain. Their factors of safety were too small,—the Merrimack and the Hudson were not large enough; the distances and times were too short; the germs survived,—and increased death-rates, amounting to epidemics, were the results. The experience thus dearly obtained, with the loss of hundreds of human lives, has taught us lessons far more valuable than any laboratory exper

iments, however interesting the latter may be. We have learned that extreme dilution, even so great that the most delicate chemical tests do not with certainty show the presence of sewage; that running for a few miles in a large and well aerated river; that storage in a reservoir capable of holding one or two weeks' supply of water; and that the passage through miles of iron pipes under pressure, — that each and all of these conditions are inadequate to render a water safe.

Professor Sedgwick has shown, in his admirable report upon the sanitary condition of Lowell, that after the Merrimack water had passed through the capacious reservoir and several miles of iron pipes, requiring in all at least several days' time, the total number of bacteria was greatly reduced, and apparently, also, the number of typhoid germs, for there were relatively less cases among the users of this water than among those who drank the canal water taken more directly from the river.

It is possible that these conditions might be so extended as to secure immunity, or, at least, so to decrease the number of disease germs that their presence would be without noticeable effect upon the public health. In view of our experience, we shall do well to inquire what limits, if any, are admissible, and, in the meantime, take good care to avoid all water supplies taken without filtration from bodies of water into which sewage directly flows. Until we have positive information that the objectionable germs cannot live beyond certain limits, we can only be justified in refusing to allow any limits, and in condemning all waters so polluted.

As a solution to our problem, we may have recourse to some method of purification, either of the sewage before turning it into the water, or of the water after it has been polluted. The only processes now known, which are at once feasible and effective in the removal of bacteria, are processes of filtration. Filtration may take place either through natural soil, or through specially prepared filters. In either case it may, or it may not, be an efficient safeguard against sewage contamination. Many household filters are notoriously inad-

equate; many old wells are unmistakable carriers of disease drawn through the soil from neighboring cesspools; while, on the other hand, people drink with impunity the water from other wells, even more grossly polluted, but in soils which are more favorable to the removal of bacteria; and in some European cities a great reduction of the death-rate from typhoid fever is effected by the introduction, not of a sewage-free water, but of a well filtered, although previously polluted, water.

The sewage of the inhabitants of a drainage area may be filtered, either from cesspools connected with each house, in which case their contents slowly soak or filter through the soil toward the water courses, or the sewage may be collected and treated by intermittent filtration. In either case, great care must be taken that no trace of sewage finds a more direct channel than was intended.

Intermittent filtration is only able to exclude bacteria from the effluent under particular conditions; and these conditions must be fulfilled to insure safety. The experiments of the Massachusetts state board of health, conducted under the direction of Mr. Hiram F. Mills, have shown what many of these conditions are. I have no time, at present, to discuss these experiments; I can only refer to the published report, and say that so much light has been obtained as to make possible reliable estimates of the results to be obtained under a wide range of local conditions.

Another way of approaching the problem is, to allow the free entry of sewage into the water courses, depending upon filtration to remove the bacteria from the water before it is delivered to consumers. In the case of large inhabited watersheds, as, for instance, that of one of our large rivers, this is the only practicable way, it being impossible to maintain adequate inspection of a large area and population.

When extensive sand deposits occur along the banks of the river or lake, wells of filter galleries sunk in them have often yielded a large amount of water, so well filtered by its passage through the sand as to be quite safe. Under other local con-

ditions, similar wells have failed to yield the quantity or quality of water desired. This method of filtration is most important, but as yet no general conclusions can be safely drawn.

When there are no sand deposits to make wells and filter galleries successful, other forms of filtration have often been used.

Very prominent are the patented mechanical filters, whose essential characteristics are very high rates for filtration through small bodies of sand, often with the use of chemicals and under pressure. Such filters have been most successful in removing suspended matters from turbid river-waters, rendering them suitable for paper and other manufacturing, and also to improve the appearance of muddy, but unpolluted, waters. The success of these filters in their proper sphere is great and unquestioned. We have, as yet, however, no proof that they are capable of removing completely the bacteria from sewage-polluted waters. Until we have positive evidence that a system of filtration, under all conditions likely to occur in practice, will exclude pathogenic germs, we shall not be justified in approving its use for sewage-polluted water. The cleaning of unpolluted water is entirely another matter, not to be confounded for an instant with the present problem.

In many European cities, another and widely different system of filtration is in use. The water to be filtered is taken on to large areas of thoroughly underdrained sand, kept continually covered with water, which slowly finds its way through the sand at a rate of one, two, or even three million gallons per acre daily. The results obtained at Berlin are especially valuable, for the engineer in charge has taken into account the removal of pathogenic germs, both as shown by laboratory experiments, and by the death-rate from typhoid fever among the users of the water.

Piefke's results show that, under conditions sure to occur without most careful superintendence, bacteria pass the Berlin filters in sufficient numbers to increase the death-rate; but by giving most careful attention to details, this can be almost

entirely avoided. If the filters do not remove every single germ, the number which escape is too small perceptibly to affect the death-rate. These results, and those of other European cities, show us that continuous filtration may, or may not, be an efficient safeguard against typhoid epidemics, according to the rate of filtration, the character of the sand employed, and other details of management.

The point is established that filters can be so constructed and managed as to afford relief. We must now endeavor to find how to attain the desired result with the minimum expense; how coarse materials can be used with safety; how rapidly water can be applied to material of various degrees of fineness? Can the best results be obtained by applying the water continuously, or at intervals, with periods of rest between, during which the filter has a chance to drain, drawing air into its pores? These, and similar questions, require definite answers. Experiments now in progress at the Lawrence experiment station were designed to throw additional light upon these points. We know that fine materials and slow rates of filtration tend to give germ-free, and consequently safe, effluents.

Some limits are already known, both from the experience of European cities and from our own experiments. Some filtering materials, at certain rates of speed, give effluents practically free from bacteria. It is possible that we shall learn by further experiment that somewhat coarser materials, or that higher rates of filtration, may be employed without danger. In the meantime, when it seems necessary to take water supplies from bodies of water into which sewage directly flows, we can best secure the public health by the use of filters which are definitely within the known limits of safety.

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ANNUAL REPORTS

OF THE

TRUSTEES, SUPERINTENDENT, AND TREASURER

OF THE

INDUSTRIAL SCHOOL

OF THE

STATE OF NEW HAMPSHIRE,

TO THE

GOVERNOR AND COUNCIL,

JANUARY, 1892.

VOLUME I. . . . PART II.

CONCORD:

IRA C. EVANS, PUBLIC PRINTER.

1892.

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MISS B. F. SCOVILLE. MISS JOSEPHINE MITCHELL.

TRUSTEES' REPORT.

To His Excellency the Governor and the Honorable Council:

The trustees of the Industrial School have the honor herewith to transmit the report of the superintendent of that institution as required by law. It will be found to contain a detailed account of all its receipts and expenditures for the year, as also a comprehensive statement of its management and operations for the same period, and which it is unnecessary here to repeat.

The suggestions he makes in regard to improvements designed to add to the enjoyment and convenience of the inmates and for their better physical development, are timely and judicious, and meet our hearty concurrence.

It must be remembered that this is not a penal institution for the punishment of crimes, but wholly reformatory, and deals exclusively with youth whose plastic natures are still capable of receiving healthful and ennobling influences from their surroundings, and whose developing bodies need the advantages suggested, in part compensation, at least, for the deprivation of that outdoor life so essential in youth to healthful and vigorous manhood and womanhood in after years.

We would also especially commend his suggestion in regard to the removal of the boiler house from so close proximity to the premises occupied by the inmates. Accidents of such frightful character so often occur by boiler explosions, that it would seem the part of wisdom to reduce this liability to the minimum by the removal of the boiler house to a reasonably safe distance from the occupied.

CHARLES H. BARTLETT,
Secretary of the Board of Trustees.

REPORT

OF THE

SUPERINTENDENT AND TREASURER.

To His Excellency the Governor, the Honorable Council, and the Honorable Board of Trustees :

I respectfully submit for your examination the annual report of the State Industrial School for the year ending September 30, 1891 :

Whole number committed to the institution since its commencement	1,455
Number in school October 1, 1890	112
Whole number in school during the year	147
Number discharged at expiration of sentence	30
“ “ on probation	4
“ honorably discharged	10
“ deaths	2
“ escaped	6
“ sent to jail	2
“ in school Sept. 30, 1891	93
Average detention of those discharged	2½ yrs.

PARENTAGE.

American	46
Irish	52
French	40
Scotch	2

Norwegian	.	.	.	.	.	.	.	.	1
Swede	.	.	.	.	.	.	.	.	1
Russian	.	.	.	.	.	.	.	.	1
Negro	.	.	.	.	.	.	.	.	3
Indian	.	.	.	.	.	.	.	.	1

HOW COMMITTED.

Number committed by supreme court	.	.	.	.	.	.	.	33
“ “ police court	.	.	.	.	.	.	.	74
“ “ justice of peace	.	.	.	.	.	.	.	39
“ “ parents	.	.	.	.	.	.	.	1

TERM OF COMMITMENT.

During minority	.	.	.	.	.	.	.	34
For the term of 8 years	.	.	.	.	.	.	.	2
“ “ 6 years	.	.	.	.	.	.	.	1
“ “ 5 years	.	.	.	.	.	.	.	13
“ “ 4 years	.	.	.	.	.	.	.	13
“ “ $3\frac{1}{4}$ years	.	.	.	.	.	.	.	1
“ “ 3 years	.	.	.	.	.	.	.	31
“ “ 2 years	.	.	.	.	.	.	.	18
“ “ $1\frac{1}{2}$ years	.	.	.	.	.	.	.	4
“ “ 1 year	.	.	.	.	.	.	.	27
“ “ 6 months	.	.	.	.	.	.	.	1
Until 18	.	.	.	.	.	.	.	1
“ 16	.	.	.	.	.	.	.	1

OFFENCE.

For stealing	.	.	.	.	.	.	.	63
“ breaking and entering	.	.	.	.	.	.	.	21
“ stubbornness, idleness, and disobedience	.	.	.	.	.	.	.	31
“ truancy	.	.	.	.	.	.	.	12
“ assault	.	.	.	.	.	.	.	6
“ malicious mischief	.	.	.	.	.	.	.	5
“ incendiarism	.	.	.	.	.	.	.	2
“ robbery of person	.	.	.	.	.	.	.	1

For lewdness	1
“ stealing horse	1
“ receiving stolen goods	1
“ being indecent and disorderly	1
“ “ common liquor seller	1
“ vagrancy	1

AGE WHEN COMMITTED.

At the age of 8 years	4
“ 9 years	4
“ 10 years	7
“ 11 years	16
“ 12 years	18
“ 13 years	24
“ 14 years	22
“ 15 years	23
“ 16 years	26
“ 17 years	3

PRESENT STANDING OF PUPILS IN SCHOOL.

Reading.

	Boys.	Girls.
Reading in United States History	29	7
“ Fourth Reader	30	3
“ Third Reader	11	2
“ Second Reader	7	
“ First Reader	4	

Writing.

Instructed in penmanship	77	12
------------------------------------	----	----

Arithmetic.

Studying percentage	9	2
“ fractions	18	4
“ denominate numbers	19	1
“ division	24	5
“ mental arithmetic	10	

Geography.

Studying Manual of Geography	20	4
“ Elementary Geography	24	4

History.

Studying History of United States	29	6
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Grammar.

Studying Lessons in English	24	6
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Philosophy.

Studying Natural Philosophy	6	2
---------------------------------------	---	---

Algebra.

Studying Algebra	5	2
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FARM.

The products of the farm are as follows :

130 tons of hay	\$1,950.00
50 tons of corn-fodder	200.00
375 bushels potatoes	150.00
60 bushels ears of corn	25.00
110 bushels carrots	40.00
85 bushels green peas	60.00
75 bushels green beans	40.00
30 bushels cucumbers	25.00
50 bushels tomatoes	12.00
150 bushels sweet corn, ears	110.00
200 bushels turnips	60.00
80 bushels beets	25.00
2,500 heads cabbage	60.00
1,800 pounds pork	110.00
250 heads celery	10.00

1 ton of squash	\$20.00
100 quarts strawberries	10.00
40 barrels apples	40.00
Lettuce, radishes, etc.	15.00
Milk	1,000.00
50 bushels onions	40.00

INVENTORY OF PROPERTY.

10 grade cows	\$300.00
11 Devon cows, thoroughbred	450.00
1 two-year-old heifer	25.00
1 grade bull calf	15.00
1 grade two-year-old heifer	20.00
4 Devon heifer calves	75.00
2 grade one-year-old Durham heifers	35.00
1 two-year-old Devon bull	40.00
1 one-year-old Devon bull	35.00
21 swine	250.00
4 horses	800.00
1 yoke of oxen	160.00

HAY, PROVISIONS, ETC.

115 tons hay	\$1,725.00
300 bushels potatoes	125.00
25 barrels flour	150.00
Pork	12.00
Kerosene	6.00
Sugar, tea, coffee, molasses, salt, spices, etc.	50.00
25 cords wood	100.00

BOYS' DINING-ROOM AND COOK-ROOM.

Cooking stove and baker	\$12.00
100 chairs	25.00
Crockery, knives, forks, iron and tin ware	60.00
Tables and table covers	40.00
Bread-trough, meat-cutter, clock, etc.	10.00
Movable closets, lamps, and lanterns	10.00

FAMILY DINING-ROOM AND COOK-ROOM.

Franconia range and furniture	\$125.00
Stoddard creamery	50.00
Refrigerators	20.00
Dining tables and chairs	40.00
Crockery, knives, forks, tins, etc. . . .	60.00

CHAIR SHOP.

Work stands	\$130.00
Clock	2.00

PRINTING OFFICE.

Press, type, etc.	\$50.00
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CARPENTER SHOP.

Lathe, carpenters' tools, benches, etc. . . .	\$150.00
---	----------

HOSIERY MILL.

Knitting machines, etc., and engine	\$3,500.00
---	------------

SHOE SHOP.

Shoes, leather, and findings	\$75.00
Lasts, tools, and benches	10.00

GIRLS' SEWING-ROOM.

Work table and cover	\$10.00
Chairs and lounge	25.00
Buttons, needle, thread, etc.	10.00
Cloth on hand	100.00
Boys' and girls' clothing	800.00
Sewing machines	100.00

CARRIAGES, WAGONS, AND FARMING UTENSILS.

1 carryall	\$80.00
1 rack wagon	12.00
2 horse carts	60.00

2 farm wagons	\$50.00
2 two-horse wagons	60.00
1 ox cart	35.00
1 express wagon	15.00
3 buggies	150.00
1 large spring wagon	25.00
1 six-horse barge	150.00
2 sleighs	100.00
4 horse sleds	35.00
12 harnesses, 4 robes	250.00
Stone drags, wheelbarrows, grindstone, 2 seed sowers	30.00
10 plows, 5 harrows, 2 cultivators	100.00
1 Kemp manure spreader (new)	100.00
Iron bars, manure forks, 2 bush scythes, snaths	12.50
Hay-cutter, shovels, spades, hoes, picks	40.00
2 mowing machines	100.00
Cart wheels, whiffletrees, eveners, and chains	25.00
2 platform scales, hay scale, beams, ropes, and blocks	40.00
Horse-rake and tedder, axes, saws, ox-yokes, and chains	50.00
Pitchforks, rakes, drills, wedges, and stone hammer	10.00
Ladders, piping tools, kettles, grain and meal chests	50.00
1 horse-power ensilage-cutter, circular saw and frame	100.00

SLEEPING-HALLS.

Bedsteads and bedding	\$1,000.00
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SCHOOL-ROOMS.

Settees, desks, and chairs (new)	\$500.00
Blackboards, clock, lamps and hangings	30.00
School books, slates, etc.	60.00
Bookcase and library books	100.00
Cabinet organ	30.00
House plants	25.00

OFFICE AND LIBRARY.

Tables, chairs, lounges, desks, safe	\$175.00
Books and bookcases	250.00
Stationery and stamps	15.00
Fire extinguishers, fire escape	100.00
Clock, hanging lamps	35.00

OFFICERS' ROOMS.

Furniture, beds, and bedding	\$500.00
12 wardrobes	80.00

RECEPTION-ROOM AND GUEST-CHAMBER.

Carpets and curtains	\$90.00
Centre and side tables, sofas, chairs	120.00
Lamps, cabinets, bookcases, books	75.00
Bed and bedding, etc.	60.00

DETAILED ACCOUNT OF CASH RECEIVED FROM OCTOBER 1, 1890, TO OCTOBER 1, 1891.

1890.

Oct. 1.	From state treasurer, quarterly appropriation	\$1,500.00
2.	Merrimack county, for board	97.50
3.	Manchester, for board	541.93
4.	Hanover, for board	19.50
6.	Alton, for board	58.50
	Keene, for board	19.50
7.	Littleton, for board	19.50
9.	Cheshire county, for board	39.00
	Coös county, for board	19.50
14.	Newport, for board	42.00
	Portsmouth, for board	19.50
	New Ipswich fair for benevolent objects . . . . .	.75

Oct.	14.	From Carroll county, for board . . .	\$39.00
	15.	Croydon, for board . . .	39.00
		Fitzwilliam, for board . . .	19.50
	17.	Concord, for board . . .	30.43
		Interest on Ex - Gov. Frederick Smyth memorial fund . . .	18.00
		Grafton county, for board . . .	75.00
	21.	Dunn & Salisbury, for chair work .	93.86
		Hillsborough county, for board .	232.72
		N. O. Garland, for rent . . .	21.00
	23.	Rockingham county, for board .	162.00
	28.	W. F. Whitney, for chair work .	300.00
Nov.	1.	Peterborough, for board . . .	76.50
	5.	Mrs. S. M. Davenport, for board .	18.00
	6.	Wolfeborough, for board . . .	1.50
	7.	P. C. Cheney Co., for moving boiler	10.00
		B. C. Hill, for rent and milk . . .	17.35
	20.	Campton, for board . . .	14.57
	25.	H. C. Ferry, for hides . . .	52.00
		Strafford county, for board . . .	66.00
		B. H. Piper Company, for oak butts .	16.00
	29.	Nashua, for board . . .	335.79
Dec.	1.	Colebrook, for board . . .	19.50
	15.	J. Brown, for board . . .	6.00
		N. O. Garland, for hay . . .	6.50
	20.	H. Willey, for pump . . .	25.00
		Kimball & Gerrish, for hide . . .	2.06
		Peter Riley, for rags . . .	26.25
	31.	J. O. Clark, for balance on account .	59.10
		I. C. Merrill, for heifer, hay, and pro- visions . . .	53.57
		I. C. Davenport, for board . . .	16.00
		Carl E. York, for hay and tomatoes .	30.81
		Manchester Stocking Co., for labor .	620.25
1891.			
Jan.	1.	State treasurer, quarterly appropria- tion . . .	1,500.00

Jan.	1.	From Fred E. Richards, for hay . . .	\$19.59
		Merrimack county, for board . . .	112.07
	2.	Littleton, for board . . .	19.50
	3.	Alton, for board . . .	58.50
		Epping, for board . . .	18.00
		Hanover, for board . . .	19.50
	5.	Newport, for board . . .	39.00
		Manchester, for board . . .	514.07
		Manchester, for labor on highway . .	199.25
	6.	Coös county, for board . . .	19.50
		Concord, for board . . .	39.00
		Whitefield, for board . . .	39.00
		L. W. Fisher, for rent . . .	7.00
		E. A. Wallace, for hay . . .	19.48
		Keene, for board . . .	10.28
	8.	Fitzwilliam, for board . . .	19.50
		Nashua, for board . . .	325.93
	9.	Interest on James McKean Wilkins fund	160.00
		Interest on Moody Kent fund . . .	145.87
		Interest on Miss Louise Penhallow fund	45.18
	10.	Grafton county, for board . . .	78.00
		Rockingham county, for board . . .	152.14
	12.	Pittsfield, for board . . .	39.00
	13.	Plaistow, for board . . .	37.50
	15.	Portsmouth, for board . . .	34.50
	16.	Hillsborough county, for board . .	296.93 .
		Croydon, for board . . .	39.00
	18.	J. Brown, for board . . .	6.50
	21.	Laconia, for board . . .	7.93
		Belknap county, for board . . .	10.93
	24.	E. James, for hay . . .	12.64
	26.	Mr. Campbell, for hay . . .	10.42
	27.	Wolfeborough, for board . . .	19.50
	29.	N. O. Garland, for rent . . .	21.00

Feb.	6.	From Cheshire county, for board . . .	\$39.00
	7.	L. W. Fisher, for rent . . .	7.00
	9.	I. C. Davenport, for board . . .	10.00
	11.	J. O. Clark, for hay . . .	58.44
	19.	J. Brown, for board . . .	6.50
	20.	Durham, for board . . .	29.14
		Peterborough, for board . . .	19.50
	21.	Mrs. Tufts, for hay . . .	8.00
		Campton, for board . . .	19.50
Mar.	4.	L. W. Fisher, for rent . . .	7.00
	5.	W. F. Whitney, for chair work . . .	300.00
	7.	Fred E. Richards, for hay . . .	16.16
	9.	I. C. Davenport, for board . . .	10.00
	19.	Manchester Provision Co., for hogs . . .	69.45
	20.	J. Brown, for board . . .	6.50
	27.	Robert Schneider, for hay . . .	10.80
		Mrs. Powers, for wood . . .	14.00
	31.	H. W. Brown, for wood . . .	6.00
		sale of hay . . .	16.20
		I. C. Merrill, for hay and beef . . .	8.30
		Carl E. York, for hay and onions . . .	53.41
		Manchester Stocking Co., for labor . . .	477.75
April	1.	state treasurer, quarterly appropriation . . .	1,500.00
		Hanover, for board . . .	13.93
	3.	Manchester, for board, labor, and scraper . . .	522.64
		Rockingham county, for board . . .	156.00
		Coös county, for board . . .	19.50
		Alton, for board . . .	58.50
		J. B. Estey, for hay . . .	31.36
	6.	Newport, for board . . .	39.00
		Keene, for board . . .	9.00
	7.	J. Stickney, for hay . . .	7.52
		Manchester Provision Co., for hogs . . .	37.08
	8.	L. W. Fisher, for rent . . .	7.00

April 9.	From Grafton county, for board . . .	\$97.50
	Campton, for board . . .	19.50
	Fitzwilliam, for board . . .	19.50
	sale of hay . . .	16.65
10.	Cheshire county, for board . . .	39.00
	Epping, for board . . .	19.50
13.	I. C. Davenport, for board . . .	10.00
	Portsmouth, for board . . .	39.00
14.	Littleton, for board . . .	19.50
	Hillsborough county, for board . . .	267.86
	Interest on James McKean Wilkins fund . . .	45.00
	Mr. Fox, for beef . . .	35.20
20.	J. Brown, for board . . .	6.50
21.	Nashua, for board . . .	333.22
22.	Carroll county, board, and N. Davis, funeral expenses . . .	72.00
23.	Belknap county, for board . . .	19.50
25.	Concord, for board . . .	39.00
27.	Whitefield, for board . . .	19.50
28.	Merrimack county, for board . . .	481.64
29.	Croydon, for board . . .	22.50
May 2.	W. F. Whitney, for chair work . . .	300.00
6.	Plaistow, for board . . .	19.50
7.	Laconia, for board . . .	19.50
13.	Wolfeborough . . .	19.50
15.	C. H. Spollet, for hay . . .	20.00
19.	I. C. Davenport, for board . . .	10.00
20.	L. W. Fisher, for rent . . .	7.00
21.	J. Brown, for board . . .	6.50
22.	T. L. Quimby, for hay . . .	6.00
25.	C. H. Simpson, for hay . . .	10.60
	G. A. Campbell, for hay . . .	8.00
26.	sale of hay . . .	14.80
30.	Strafford county, for board . . .	83.93
June 1.	Interest on James McKean Wilkins fund . . .	45.00

June 3.	From state treasurer, part of appropriation	
	for improvements	\$2,000.00
13.	Z. B. Stuart, for hay	26.16
15.	E. O. Dodge, for labor	2.00
	L. W. Fisher, for rent	7.00
19.	J. Brown, for board	6.50
20.	Pittsfield, for board	19.50
22.	A. Downing, for board	5.00
	I. C. Davenport, for board	10.00
26.	David Sargent, for beans	3.50
30.	H. W. Brown, for hay and milk	4.00
	Moore & Preston, for pasturing and labor	11.38
	I. C. Merrill, for flour and beef	10.38
	Manchester Stocking Co., for labor	755.55
	Carl E. York, for hay	65.10
	J. J. Abbott, for hay	16.83
July 1.	state treasurer, quarterly appropriation	1,500.00
	Interest on James McKean Wilkins fund	70.00
2.	Strafford county, for board	48.43
3.	Manchester, for board	426.64
	J. H. Campbell, for hay	8.13
4.	Colebrook, for board	9.86
	Alton, for board	58.50
	Hanover, for board	19.50
6.	Fitzwilliam, for board	6.00
7.	Littleton, for board	19.50
	Rockingham county, for board	156.00
9.	Dover, for board	14.36
	Keene, for board	19.50
	Coös county, for board	39.00
	Campton, for board	19.50
10.	Hillsborough county, for board	256.72
13.	L. W. Fisher, for rent	7.00
	Horace Marshall, for hay	8.71

July 14.	From Grafton county, for board . . .	\$97.50
16.	J. H. Wiggin, & Co., for hay . . .	97.45
	Nashua, for board	301.29
	Plaistow, for board	19.50
	N. O. Garland, for hay	6.60
18.	Peterborough, for board	39.00
	Exeter, for board	15.00
20.	J. Brown, for board	6.50
	Carroll county, for board	19.50
21.	Haverhill, for board	58.50
23.	Laconia, for board	19.50
	Wolfeborough, for board	19.50
24.	Concord, for board	39.00
27.	Pittsfield, for board	6.86
	Epping, for board	19.50
30.	I. C. Davenport, for board	12.00
	Merrimack county, for board	219.22
Aug. 5.	L. W. Fisher, for rent	7.00
	Cheshire county, for board	39.00
12.	Croydon, for board	1.50
13.	Haverhill, for board	19.50
21.	J. Brown, for board	6.50
Sept. 6.	Newport, for board	39.00
9.	L. W. Fisher, for rent	7.00
	I. C. Davenport, for board	10.00
	interest on James McKeanWilkins fund	45.00
	E. A. James, for hay	18.19
14.	New Boston, for board	38.50
15.	Portsmouth, for board	21.64
22.	J. Brown, for board	6.50
30.	state treasurer, appropriation} for improvements	2,000.00
	Public Market and Packing Co., for hay	12.42
	Carl E. York, for hay	33.85
	E. M. Slayton, for hay and shotes	47.55
	Manchester Stocking Co., for labor	752.70

DETAILED ACCOUNT OF CASH PAID.

T. R. TAGGART.

1890.

Oct. 4.	For labor on new barn			\$25.50
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JAMES J. WILLIAMS.

Oct. 8.	For tuning and repairing piano			\$3.25
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FRED CLASSE.

Oct. 9.	For labor 5 days			\$5.00
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1891.

July 28.	10 days' labor haying		15.00	
			<u>15.00</u>	\$20.00

D. A. BUTTERFIELD.

1890.

Oct. 11.	For 2,960 lbs. straw			\$14.80
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1891.

Feb. 16.	2,740 lbs. straw		13.71	
			<u>13.71</u>	\$28.51

S. W. SCOTT.

1890.

Oct. 27.	For 1 box soap			\$2.00
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S. L. FLANDERS.

	For phosphate			\$20.00
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POST-OFFICE.

For box rent from Oct. 1, 1890,

to Oct. 1, 1891			\$6.00
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3 keys			.75
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	<u>6.75</u>	\$6.75
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AMOSKEAG MANUFACTURING CO.

Oct. 31.	For 2 coil pipes			\$4.00
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1891.

Sept. 30.	2 iron tanks			9.00
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	<u>13.00</u>	\$13.00
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B. C. HILL.

1890.

Nov. 7.	For painting and repairing tenant house	\$6.25
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AMERICAN EXPRESS CO.

For boxes, bundles, from May 5, 1890, to May 16, 1891 .	\$10.65
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L. H. WILSON.

Nov. 7.	For 22½ lbs. butter, \$5.62 ; 1 lot squashes, \$2.00	\$7.62
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I. E. STANHOPE.

Oct. 21.	For veterinary services and medicine	\$8.30
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D. J. ADAMS.

June 3.	For repairing keys and filing saws	\$2.35
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G. D. PARKER.

For repairing boots and shoes from Nov., 1890, to Sept. 23, 1891	\$37.65
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J. B. WIGGINS.

Nov. 24.	For 131 lbs. turkey, \$28.82 ; 183 lbs. chicken, \$31.11 .	\$59.93
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L. BELL.

1890.

Nov. 27.	For 1 bu. peanuts	\$2.25
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PEOPLE'S GAS LIGHT CO.

April 5.	For 24 No. 1 fire brick . . .	\$1.68
1891.		
June 30.	35 lbs. fire clay, 70c ; 25 fire brick, \$1.75 . . .	2.45
		<hr/>
		\$4.13

E. A. CILLEY.

1890.

Oct. 23.	For salting and tending cattle for the season	\$6.00	
Dec. 3.	making yard in pasture, \$3 ; getting cattle	4.00	
		<hr/>	\$10.00

HENRY K. BARNES.

Sept. 2.	For horse nozzles	\$3.00	
1891.			
April 29.	2 connections, etc., for boiler	2.38	
		<hr/>	\$5.38

DANIEL W. BILL.

1890.

Dec. 1.	For 10 gals. boiled cider, \$7.50 ; keg, \$1.00	\$8.50	
1891.			
April 15.	116½ lbs. maple sugar, \$11.65 ; 40 gals. syrup, \$40.00 ; barrel, \$1.25 . .	52.90	
		<hr/>	\$61.40

WESTERN UNION TELEGRAPH CO.

	For telegrams from Oct. 1, 1890, to Sept. 30, 1891	\$10.86
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GERVAIS & CO.

1890.

Dec. 1.	For 12 prs. blankets	\$9.00
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DUNMORE & MC QUARRY.

Nov. 18.	For 12 tin basins, 97c ; 6 pitch- ers, 90c ; 2 clothes baskets, 70c	\$2.57	
1891.			
Jan. 6.	2 dish pans80	
		<hr/>	\$3.37

S. B. HOPE.

1890.

Dec. 6.	For 46 gals. vinegar, \$9.20 ; 99 lbs. butter, \$24.75 . . .	\$33.95
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DR. JABEZ ALEXANDER.

Dec. 9.	For veterinary services . . .	\$6.00
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DRAKE & PARKER.

Nov. 3.	For 50 lbs. flour	\$312.50
Dec. 4.	1 cask cement, \$3.00 ; 10 bbls. Pillsbury's flour, \$62.50	65.50
		<hr/> \$378.00

F. L. BURNHAM.

Dec. 10.	For 1 bbl. apples, \$1.50 ; 6 bu. seed potatoes, \$6.00 . . .	\$7.50
1891.		
April 13.	11 bu. potatoes	9.00
		<hr/> \$16.50

FIRST CONGREGATIONAL SOCIETY.

For rent of 3 seats from October 1, 1890, to July 1, 1891 . . .	\$25.20
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CONCORD & MONTREAL R. R. CORP.

For freight from Oct. 10, 1890, to Oct. 3, 1891	\$169.53
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JOHN N. FOSS.

Nov. 14.	For clipping 3 horses, \$7.50 ; horse keeping, \$2.40 . . .	\$9.90
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D. S. KIMBALL.

Dec. 13.	For 3 horse blankets, \$10.50 ; 1 robe, \$8.50 ; harness, \$18.00 ; 2 straps, 50c . . .	\$37.50
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Dec. 20.	For blanket and surcingle, \$2.25 ; bit, \$1.50 ; sweat pad, 75c	\$4.50	
		<hr/>	\$42.00

SAMPSON, MURDOCK & CO.

Dec. 17.	For 1 Manchester Directory		\$2.00
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DAVID KIMBALL.

Dec. 20.	For 20 $\frac{1}{6}$ bu. potatoes		\$15.12
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J. W. BRYANT.

Dec. 20.	12 $\frac{1}{2}$ bu. potatoes		\$7.50
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L. H. JOSSELYN & CO.

Aug. 13.	For 2 chestnut tables		\$4.50
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F. J. BIXBY.

Dec. 24.	For 41 lbs. turkey	\$6.15	
Jan. 21.	34 $\frac{1}{4}$ lbs. turkey, \$6.15 ; eggs, 35c	6.50	
		<hr/>	\$12.65

J. TRUESDALE & SON.

Dec. 25.	For 1 trunk, \$2 ; 3 prs. buck gloves, \$4.50	\$6.50	
May 2.	4 trunks, \$8.50 ; job lot hats and caps, \$6.50	15.00	
		<hr/>	\$21.50

JOHN B. CLARKE.

1891.	For Daily Mirror and American from April 1, 1890, to Oct. 1, 1891	\$9.00	
April 22.	advertising examination, \$6.37 ; printing 500 pro- grammes, \$2	8.37	

July 11. For 1 gro. cover paper, 25c; printing 1,000 envelopes, \$2.50	\$2.75	
	<hr/>	\$20.12

UNION PUBLISHING CO.

1891. For Daily Union from July 1, 1890, to July 1, 1891	\$6.00	
April 22. advertising	12.40	
	<hr/>	\$18.40

CHARLES H. ROBIE.

1890.		
Nov. 10. For laying gravel roof		\$63.00

LELAND, RICE & CO.

Oct. 28. For 12 suits clothes		\$33.00
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JAMES B. DAY.

Dec. 31. For 8,540 lbs. coal		\$31.02
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CHARLES H. KIMBALL.

Dec. 9. For 1 accordion, \$2.00; 6 har- monicas, 75c; music, 65c		\$3.40
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WM. H. VICKERY.

Dec. 15. For repairing locks and keys		\$1.35
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J. C. RAY.

1890.		
Dec. 29. For 7 bbls. apples		\$24.00

H. C. FERRY.

Dec. 29. For 2,034 lbs. beef in Oct. and Nov.	\$115.65	
22. 1,382 lbs. beef	96.13	

Dec. 22.	For 2,560 lbs. beef from Jan.		
	16, to May 26, 1891 .	\$187.36	
	1,420 lbs. beef in July and		
	Aug.	97.35	
		<hr/>	\$496.49

WESTON & HILL.

1890.

Dec. 30.	For 26 prs. blankets, \$39.00 ;		
	15 comforters, \$13.88 . . .		\$52.88

BLACKSTONE & FISHER.

	For extracting teeth for inmates		
	from April 18, 1889, to Dec.		
	22, 1890		\$13.00

A. N. CLAPP.

	For 10 bbls. kerosene from Oct.		
	23, 1890, to Sept. 7, 1891 .		\$61.02

C. T. ALLEN.

1890.

Oct. 1.	For 3 qts. oysters, \$1.20 ; 3 lbs.		
	crackers, 30c ; 8 lbs.		
	chicken, \$1.60 . . .	\$3.10	
14.	7½ lbs. lamb, \$1.35 ; 3 qts.		
	oysters, \$1.20 ; 11½ lbs.		
	steak, \$2.58 . . .	5.13	
Nov. 8.	9½ lbs. fowl, \$1.62 ; 3 lbs.		
	crackers, 30c ; 3 qts.		
	oysters, \$1.05 . . .	2.97	
Dec. 2.	6 qts. oysters, \$2.25 ; 6 lbs.		
	crackers, 60c ; 4½ lbs.		
	lobster, 68c . . .	3.53	
20.	1 gal. oysters, \$1.60 ; 3 lbs.		
	crackers, 30c ; 4⅞ lbs.		
	fish, 73c . . .	2.63	
30.	8 lbs. steak . . .	1.60	

1891.

Jan. 10.	For 14 $\frac{3}{4}$ lbs. fish, \$2.59 ; 1 gal. oysters, \$1.75 ; 3 lbs. crackers, 30c . . .	\$4.64
Feb. 3.	1 gal. oysters, \$1.76 ; 4 lbs. crackers, 40c ; 8 $\frac{5}{8}$ lbs. fish, \$1.48 . . .	3.64
28.	3 qts. oysters, \$1.20 ; 3 lbs. crackers, 30c ; 10 $\frac{1}{2}$ lbs. fish, \$1.89 . . .	3.39
Mar. 21.	1 gal. oysters, \$1.60 ; 3 $\frac{1}{2}$ lbs. crackers, 35c . . .	1.95
28.	9 $\frac{1}{2}$ lbs. fish, \$1.71 ; 3 qts. oysters, \$1.20 ; 3 $\frac{1}{4}$ lbs. crackers, 33c . . .	3.24
April 11.	6 $\frac{1}{2}$ lbs. fish, \$1.04 ; 14 $\frac{1}{4}$ lbs. fowl, \$2.85 ; 12 lemons, 25c . . .	4.14
23.	dandelions, 25c ; 22 $\frac{1}{4}$ lbs. fish, \$2.56 . . .	2.81
May 30.	35 $\frac{1}{8}$ lbs. fish, \$5.09 ; 10 lbs. veal, \$1.50 . . .	6.59
June 27.	7 $\frac{3}{4}$ lbs. mutton, \$1.24 ; 34 $\frac{5}{8}$ lbs. fish, \$5.88 . . .	7.12
July 18.	35 lbs. fish, \$4.90 ; 4 boxes berries, 60c . . .	5.50
Aug. 22.	14 $\frac{3}{4}$ lbs. mutton, \$2.33 ; sausage, 15c . . .	2.48
Sept. 30.	8 $\frac{3}{4}$ lbs. veal, \$1.32 ; 8 lbs. mackerel, \$1.00 . . .	2.32
		<hr/> \$66.78

PETTEE & ADAMS.

1890.

Oct. 27.	For 20 bags meal, \$27.00; 1 bag oats, \$1.30 . . .	\$28.30
Nov. 13.	10 bags oats, \$12.20; 5 bags corn, \$6.60; 5 bags meal, \$6.60; 350 lbs. bran, \$4.20 . . .	29.60
Dec. 29.	12 bags corn, \$15.70; 22 bags oats, \$26.60; 8 bags meal, \$10.40 . . .	52.70

1891.

Jan. 31.	21 bags meal, \$27.90; 9 bags oats, \$11.60; 600 lbs. bran, \$8.40; 1 bbl. cement, \$3.50 . . .	51.40
Feb. 21.	1 bbl. lime, \$1.10; 16 bags meal, \$21.12; 7 bags oats, \$8.90; 800 lbs. bran, \$10.80; 6 bags, 90c . . .	42.82
Mar. 10.	54 bbls. flour, \$320.80; 30 bags meal, \$40.80; 12 bags oats, \$15.20 . . .	376.80
April 24.	10 bags oats, \$14.59; 10 bags meal, \$16.90; 600 lbs. bran, \$8.80 . . .	40.29
May 26.	50 bbls. flour, \$312.50; 1 bbl. cement, \$1.45 . . .	313.95
June 22.	14 bags oats, \$18.65; 17 bags meal, \$23.80; 400 lbs. bran, \$5.00 . . .	47.45
July 6.	7 bags meal, \$10.15; 12 bags oats, \$15.20; 175 lbs. bran, \$2.10 . . .	27.45
Aug. 25.	200 lbs. plaster, \$3.30; 12 casks cement, \$18.60 . . .	21.90
		<hr/> \$1,032.66

LEWIS K. MEAD.

1890.

Oct. 14.	For 3 prescriptions, \$1.15; 4 oz. iodine, 50c; comb, 20c	\$1.85
Nov. 18.	2,000 Fraser's tablets, \$3.50; 4 bottles sarsaparilla, \$3.40	6.90
Dec. 4.	powder bellows, 20c; 1 gal. witch hazel, \$1.25	1.45

1891.

Jan. 10.	Fellows' syrup, \$1.25; cough medicine, 85c; salve, 25c	2.35
Mar. 24.	2 bottles beef, iron, and wine, \$1.50; soap, \$1.20; nitre, 25c; prescription, 30c	3.25
April 5.	Fellows' syrup, \$1.25; 2 bottles cod liver oil, \$1.70	2.95
22.	5 prescriptions, \$2.35; 2 bottles McGee's emulsion, \$1.70	4.05
May 23.	3 prescriptions, \$2.00; essence checkerberry, 8c; Herald, 5c	2.13
June 3.	Hive syrup, 25c; 2 bottles cod liver oil, \$1.70; 2 prescriptions, \$1.05	3.00
30.	2 bottles cod liver oil, \$1.70; 4 prescriptions, \$1.65; Herald, 5c	3.40
July 3.	2 bottles beef, iron, and wine, \$1.50; quinine and mustard, 50c	2.00
16.	flaxseed, 30c; cod liver oil, 85c; prescription, 85c	2.00

Aug. 6.	For liniment, 75c; Arnold's bal- sam, 25c; Fellows' syrup, \$1.25 . . .	\$2.25	
Sept. 5.	2 oz. paregoric, 15c; 3 oz. corks, 15c; sealing wax, 5c . . . . .	.35	
21.	2 bottles cod liver oil. . .	1.75	
		<hr/>	\$39.63

BARTON & CO.

1890.

Oct. 4.	For 547 $\frac{3}{4}$ yds. cotton, \$46.78; 114 yds. silesia, \$8.55 .	\$55.33	
Nov. 6.	206 $\frac{1}{4}$ yds. shirting, \$18.60; 53 $\frac{3}{4}$ yds. cambric, \$2.55	21.15	
Dec. 17.	44 yds. toweling, \$3.96; 3 doz. hose, \$3.50; 6 doz. handkerchiefs, \$3.60 .	11.06	
23.	5 prs. blankets, \$3.75; 18 doz. cotton, \$4.32; 12 papers needles, 50c .	8.57	
	1 gro. buttons, 50c; box twist, 45c . . . . .	.95	

1891.

April 4.	59 $\frac{1}{2}$ yds. silesia, \$4.46; 17 $\frac{3}{4}$ yds. drilling, \$2.22 .	6.68	
9.	493 $\frac{3}{4}$ yds. denim, \$61.72; 17 $\frac{1}{2}$ yds. shirting, \$2.01	63.73	
30.	86 $\frac{3}{4}$ yds. crash, \$8.84; 2 jackets, \$10.00 . . .	18.84	
May 25.	161 $\frac{3}{4}$ yds. cotton, \$7.25; 523 $\frac{3}{4}$ yds. shirting, \$44.52	51.77	
June 19.	100 yds. crash, \$5.63; 1 jacket, \$5; 4 gro. but- tons, \$2.00	12.63	
Sept. 28.	160 yards denim . . .	20.80	
		<hr/>	\$271.51

CHAS. A. HOITT & CO.

1890.

Oct. 11.	For 9 $\frac{5}{12}$ doz. chimneys, \$7.72 ; 2 doz. mugs, \$2.00 ; 3 reflectors, \$1 . . .	\$10.72
Dec. 22.	15 chairs, \$48.00 ; 2 lamps, \$8.50	56.50

1891.

Jan. 13.	12 lamp chimneys, 75c ; shade, 75c ; 2 stone jars, \$1.25	2.75
29.	2 sets dishes, \$44.53 ; 12 mugs, \$1.00 ; 1 $\frac{1}{2}$ doz. bakers, \$3.00 . . .	48.53
Mar. 18.	1 mattress, \$17.00 ; 12 mir- rors, \$1.75 ; 3 chimneys, 75c	19.50
April 27.	4 doz. knives and forks, \$5.00 ; 3 doz. mugs, \$3.00 ; 2 ladles, 80c .	8.80
28.	6 doz. tea spoons, 60c ; 4 harps, \$1.19 ; 2 pitchers, \$1.00 ; chair, \$1.34 .	4.13
May 21.	3 $\frac{1}{3}$ doz. salts, \$1.00 ; couch, \$25.00 ; 2 doz. chim- neys, \$1.40	27.40
Sept. 14.	1 chamber set, \$35.00 ; wire mattress, \$7.50 ; hair mattress, \$15.00 . . .	57.50
	1 toilet set, \$6.00 ; 12 chimneys, \$1.00 . . .	7.00

 \$242.83

DARWIN A. SIMONS.

1890.

June 2.	For 10 rolls paper, \$1.00 ; 21 yds. border, 42c ; 12 bowls, \$1.06	\$2.48
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Dec. 23.	For 12 chimneys, \$1.20; 10 wicks, 55c; wick lifter, 15c	\$1.90	
1891.			
April 23.	18 doz. plates, \$15.90; 3 butter dishes, \$1.35; 6 pitchers, \$2.10	19.35	
	3 creamers, 60c; 3 platters, \$2.25; 4 nappies, \$1.80; 5 doz. tumblers, \$1.75 .	6.40	
	3 dish pans, \$1.25; wash bowl, 40c; 6 water pitchers, \$2.28	3.93	
	2 doz. peppers, \$2.16; 2 doz. vinegars, \$5.00; 2 teapots, \$2.50	9.66	
			<hr/>
			\$43.72

CLARK & ESTEY.

1890.			
July 28.	For 3 gro. buttons, 95c; 4 papers needles, 16c; 1 pr. shears, 37c	\$1.48	
Oct. 3.	For 19 doz. cotton, \$7.60; 6 thimbles, 5c; box twist, 45c	8.10	
Nov. 6.	2 $\frac{5}{8}$ doz. undervests, \$12.04; 5 doz. suspenders, \$5.00; 3 doz. cotton, \$1.20 .	18.24	
Dec. 19.	7 $\frac{1}{4}$ doz. scarfs, \$17.62; 4 prs. rubber boots, \$4.00; 8 doz. gloves, \$13.00 .	34.62	
23.	1 doz. shirts, \$6.00; 20 doz. handkerchiefs, \$8.18; 6 harmonicas, \$1.00 . .	16.18	
	11 $\frac{1}{3}$ doz. ties, \$9.83; 5 rolls ribbon, \$5.39; 5 doz. dominoes, \$3.50	18.72	

Dec. 23.	For 5 yds. tarleton, 63c; 10 prs. mittens, \$1.52; $1\frac{1}{6}$ gro. combs, \$5.76; 18 tooth brushes, \$1.20 . . .	\$9.11
1891.		
Feb. 14.	18 doz. cotton, \$6.48; 5 papers needles, 20c; 12 thimbles, 15c . . .	6.83
April 30.	7 hats, \$11.02; 6 doz. papers pins, 90c; $\frac{1}{2}$ gro. collar buttons, 25c . . .	12.17
May 28.	$2\frac{1}{2}$ doz. shirts, \$5; 2 doz. papers needles, 96c . . .	5.96
June 24.	1 roll ribbon, \$1.25; 3 doz. hose, \$3.75	5.00
		<hr/> \$136.41

HARLEY & ROBBIE.

1890.		
Nov. 6.	For 369 yds. cotton, \$51.29; $16\frac{3}{4}$ yds. damask, \$5.86 . . .	\$57.15
	17 prs. blankets, \$22.84; 1 doz. towels, \$1.75; 2 lbs. batting, 23c . . .	24.82
	$50\frac{1}{4}$ yds. silesia, \$4.15; 225 yds. shirting, \$16.13; brushes and combs, \$2.40 . . .	22.68
Dec. 22.	$99\frac{1}{4}$ yds. nainsook, \$9.43; 7 rolls ribbon, \$8.10; 4 satchels, \$2.48 . . .	20.01
	$14\frac{1}{4}$ doz. handkerchiefs, \$8.81; 1 doz. mufflers, \$4; $51\frac{1}{2}$ yds. cambric, \$2.58	15.39
1891.		
April 22.	360 yds. gingham, \$26.56; 4 prs. curtains, \$15.60 . . .	42.16

April 22.	For 25 $\frac{1}{4}$ yds. muslin, \$9.69;		
	rug, \$3.75; 4 poles,		
	\$1; 19 yds. pongee,		
	\$2.15	\$16.59	
	426 $\frac{1}{2}$ yds. cotton, \$34.33;		
	56 yds. glass linen, \$5.32	39.65	
30.	5 yards oil-cloth, \$1.15;		
	rug, \$17.50; 36 yds.		
	fringe, \$4.50	23.15	
		<hr/>	\$261.60

F. L. WALLACE & CO.

1890.

Dec. 8.	For 5 gals. disinfectant . . .	\$5.00	
16.	coffin and burial expenses of		
	Noel Davis	12.00	
		<hr/>	\$17.00

TEMPLE & FARRINGTON.

1890.

Dec. 17.	For 2,000 envelopes, \$5.50; 2		
	reams paper, \$2.50; 1		
	qt. ink, 75c	\$8.75	
24.	120 books, \$46.31; ink-		
	stand, \$1.50; blank		
	book, \$2	49.81	
27.	1 gro. pens, \$1; 1 $\frac{1}{2}$ gro.		
	pencils, \$1.50; 1,000		
	note heads, \$6.50	9.00	
Jan. 14.	1 N. H. Register, 20c; en-		
	velopes, 30c; 300 tags,		
	36c; 6 erasers, \$2	2.86	
Feb. 26.	1 journal \$2.82; 500 pos-		
	tal cards and printing,		
	\$6.50; 1 qt. ink, 75c . . .	10.07	
Mar. 29.	$\frac{1}{4}$ ream journal paper	1.88	

April 13.	For 6½ reams paper, \$4.75; 1 frame, glass, and mat, \$5	\$9.75	
28.	30 books for Ex-Gov. Fred- erick Smyth memorial prizes	31.36	
		<hr/>	\$123.48

C. H. MARTIN & CO.

1890.

Mar. 14.	For 1 bbl. oil, \$33.07; 32 lbs. paint, \$5.33	\$38.40	
	7 paint brushes, \$3.30; 2 gals. dryer and can, \$1.85	5.15	

1891.

Jan. 15.	2 qts. ammonia, 60c; pills, \$2.90; 12 bottles indeli- ble ink, \$2	5.50	
	1 qt. senna, 60c; 1 qt. rhu- barb, 70c; 3 bottles cough medicine, \$2.25	3.55	
	2 doz. plasters, \$3; 1 doz. bottles toothache medicine, \$1.50	4.50	
		<hr/>	\$57.10

WALKER & PRATT MANUFACTURING CO.

1890.

Oct. 31.	For 1 steam kettle and stand . . .	\$34.20	
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1891.

Aug. 28.	1 grate for laundry stove . . .	1.00	
		<hr/>	\$35.20

JOHN B. VARICK CO.

1890.

Oct. 1.	For 5¾ bu. grass seed and bags, \$10.62; 6 pails, 62c; 2 B. D. stays, 24c	\$11.48	
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Oct.	8.	For 10 lts. glass, \$1.05; razor, 75c; box glass, \$3; 2 knobs, 13c	\$4.93
	24.	1 $\frac{3}{4}$ lbs. solder, 33c; 2 $\frac{1}{2}$ sq. ft. ground glass, 50c; 2 doz. knives, \$2.30 . . .	3.13
	27.	12 chimneys, 50c; 7 doz. bolts, \$1.77; 1 gal. harness oil, 75c	3.02
		2 oz. sponge, 36c; 6 brush brooms, 75c; ball twine, 12c	1.23
	28.	5 $\frac{2}{3}$ yds. brass chain, 85c; 3 hooks, 9c; 2 shovels, \$1.84	2.78
Nov.	6.	1 polishing iron, 62c; 301 lbs. lead pipe, \$21.07; reel, \$1.50	23.19
	27.	2 forks, 75c; razor hone, 40c; 1 doz. brooms, \$2.87	4.02
Dec.	5.	5 lantern globes, \$3.25; 6 papers tacks, 57c; 2 brushes, 40c	4.22
	24.	24 prs. skates, \$12; 12 sleds, \$7.75; 5 gro. clothes pins, 65c . . .	20.40
		1 wood saw and frame . . .	.75
	31.	5 paint brushes, \$3.10; saw-horse, 25c; twine, 15c; 12 brooms, \$1.75 . . .	5.25
1891.			
Jan.	1.	2 dusters, 75c; 12 lock springs, 10c; cask nails, \$2.25; 6 bolts, 18c . .	3.28
	2.	1 pr. hinges, 15c; 2 lbs. sash cord, 70c; 100 lbs. Phœnix lead, \$7.25 . .	8.10

Jan. 14.	For 2 lbs. lamp black, 34c; 10 lbs. cal. plaster, 20c; 10 lbs. cement, 60c . . .	\$1.14
20.	41 lbs. paint, \$5.94; 5 gals. oil and can, \$4.15; 3 brushes, \$1.75 . . .	11.84
22.	1 cask nails, \$3.18; sand paper, 20c; 12 pails, \$1.50; 6 boxes plant food, 75c . . .	5.63
23.	2 lbs. glass, 27c; 1 lb. brads, 10c; $\frac{1}{2}$ lb. nails, 3c; duster, 50c; glue, 20c . . .	1.10
24.	1 screw-driver, 30c; 2 hammers, 50c; 41 lbs. sheet zinc, \$3.28 . . .	4.08
27.	2 gals. Pratt's dryer, \$2; 1 gal. asphaltum, 80c; $\frac{1}{2}$ lb. sienna, 5c. . . .	2.85
28.	2 pails, 60c; 1 lock, 40c; brush, 75c; 95 lbs. plaster, 47c. . . .	2.22
31.	1 qt. oil, 25c; faucet, 75c; sponge, 60c; 2 clothes lines, 40c	2.00
Feb. 3.	20 lbs. paint, \$3.20; scrub brush, 10c; $\frac{1}{2}$ gal. varnish, \$2	5.30
10.	1 gal. spirits, 60c; 50 lbs. Phœnix lead, \$3.75; 25 lbs. plaster, 50c . . .	4.85
11.	2 dusters, 80c; 1 gro. screws, 77c; 33 lbs. hinges, \$1.98 . . .	3.55
13.	3 packages alabastine, \$1.20; 2 6-tined forks, \$1.50	2.70

Feb. 14.	For 2 gals. asphaltum, 80c; clothes wringer, \$11; 12 brooms, \$1.62 . . .	\$13.42
19.	1 carving knife, \$1.15; 1 doz. rings and staples, 35c; 6 hooks, 15c . . .	1.65
21.	1 sink, \$1.60; 2 pieces plate glass, 50c; 2 brushes, 70c	2.80
Mar. 3.	2 gals. neat's-foot oil, \$2; 6 pails, 65c; 6 cattle cards, 38c . . .	3.03
13.	2½ lbs. packing, 88c; box glass, \$3; 1 keg spikes, \$2.20 . . .	6.08
23.	2 lbs. sash cord, 30c; 1 lock, 42c; 6 clothes lines, \$1.20 . . .	1.92
26.	25 lbs. putty, 75c; bread cutter, \$3.50; 2 halters, 40c; soap, 5c . . .	4.70
30.	2 balls, \$2.50; 3 razors, \$1.08; razor strop, 25c; comb, 10c; seeds, 33c .	4.26
April 4.	3½ doz. ox balls, \$1.85; oil can, 50c; stove polish, 5c . . .	2.40
10.	34 bolts, 49c; 2 rakes, 80c; padlock, 30c; 4 brushes, \$2.68 . . .	4.27
13.	1 box glass, \$3; 13 rakes, \$4.05; 4 plow points, \$2.67 . . .	9.72
24.	2 gals. turpentine, \$1.20; scraper, 60c; broom, 50c; 10 hoes, \$3.75 . . .	6.05
25.	3 manure forks, \$2.25; sand paper, 20c; silver polish, 25c . . .	2.70

April 28.	For plow casting, 15c; 12 brooms, \$2.50; 6 pails, 75c; twine, 15c . . .	\$3.55
30.	5 yds. chain, 8c; 12 balls, \$8.25; 12 bats, \$2 . . .	10.33
May 4.	12 scrub brushes, \$4.50; 6 front cultivators, \$2.70; 12 lts. glass, 54c . . .	7.74
8.	7 lbs. iron, 17c; 1 $\frac{1}{4}$ lbs. washers, 10c; parts Kemp's spreader, \$2.20 . . .	2.47
18.	200 lbs. phosphate, \$3.50; 2 prs. hinges, 40c; 9 catches, 86c . . .	4.76
19.	3 lbs. twine, 48c; lock, 60c; 2 hammers, \$1; 20 lbs. nails, 70c . . .	2.78
21.	vegetable and grass seed, \$21.75; 12 brooms, \$2.25; 12 balls, \$6.25 . . .	30.25
27.	176 lbs. size paper, \$5.28; 10 lbs. roofing tacks, 80c; 10 lbs. pins, 60c . . .	6.68
28.	78 bolts, \$1.46; hitch rope, 20c; 120 lbs. tarred paper, \$3.60 . . .	5.26
1891.		
June 1.	12 harness pins, \$1.25; 1,500 sq. ft. roof paper, \$15; bolts, 12c . . .	16.37
2.	25 lbs. nails, 80c; paint brush, 70c; lock, 20c; 10 lbs. paint, \$1.56 . . .	3.26
15.	1 pr. hangers, 40c; 1 doz. screws, 6c; 18 lbs. iron, 38c; 18 lbs. rope, \$1.80 . . .	2.64

June 19.	For 1 razor strop, 25c; 33 bolts, 74c; washers, 3c; 4½ lbs. solder, 81c . . .	\$1.83
July 2.	2 axes and handles, \$1.84; balls and bats, \$14.50; whip, \$1 . . .	17.34
8.	6 bits, \$1.49; 1 lb. rivets, 13c; 13 lbs. iron, 29c; 12 brooms, \$1.75; seed, 10c . . .	3.76
17.	2 drag rakes, \$1.20; 12 rake teeth, 15c; 1 refrigerator, \$25 . . .	26.35
20.	27½ lbs. rope, \$2.97; razor, comb, and brush, 88c; 6 bats, \$1.13 . . .	4.98
25.	½ lb. rivets, 5c; 50 hay caps, \$12.50; 25 pins, \$2; 38 lts. glass, \$2.68 .	17.23
Aug. 5.	1 paper glazier's points, 6c; 189 ft. poultry wire, \$1.42; tacks, 5c . . .	1.53
19.	3 rattan brooms, \$1.35; 6 shovels, \$3.50 . . .	4.85
		<hr/> \$380.00

J. STICKNEY.

1890.

Nov. 26.	For 1 foot-ball, \$1.25; 2 prs. mittens, \$1.80; 1 pr. gloves, 90c . . .	\$3.95
Dec. 27.	1 rubber throat bag, 85c; 1 can liquid glue, 15c .	1.00

1891.

Jan. 30.	2 cans harness dressing, 90c; 20½ lbs. sole leather, \$4.46 . . .	5.36
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Feb. 6.	For 1½ lbs. calf-skin, \$1.28; 1 last, 25c; hammer, 50c; 2 knives, 25c	\$2.28
22.	4 qts. shoe pegs, 20c; 1 ball shoe thread, 10c; 6 awls, 10c; edge iron, 25c65
Mar. 18.	3 bottles cement, 25c; 1½ doz. washers, 45c; shaft rubber, 75c	1.45
April 2.	1 foot-ball, \$1.25; knobs, 10c; 1 bar harness soap, 50c	1.85
May 28.	1 can harness dressing, 45c; 2 hose nozzles and sprinkler, \$1.37	1.82
June 25.	23 ft. belting	2.28
July 20.	2 boxes carriage washers, 75c; 2½ lbs. packing, 63c	1.38
Aug. 31.	10 doz. can rings, \$1; 12 apple knives, 50c	1.50
Sept. 25.	43 ft. leather belting, \$7; 1 gro. shoe lacings, 75c	7.75
		<hr/> \$31.27

PLUMER & HOLTON.

1890.

July 8.	For 8 hats, \$1.70; 3 doz. shirts, \$9	\$10.70
Dec. 24.	1¼ doz. prs. gloves, \$6.55; 5 coats, \$7.50	14.05

1891.

Mar. 26.	8 boxes collars, 80c; 12 ties, \$1.20; 2 hats, 30c	2.30
Sept. 15.	1 overcoat	3.00
		<hr/> \$30.05

PARTRIDGE BROS.

1890.

Oct. 29.	For 7 bags corn, \$9.35 ; 6 bags oats, \$7.50 ; 1,400 lbs. shorts, \$16.80 . . .	\$33.65
Nov. 25.	2 bu. salt, \$1 ; 12 bags meal, \$16.20 ; 6 bags oats, \$7.50 . . .	24.70
Dec. 9.	1,400 lbs. shorts, \$17.10 ; 5 bags oats, \$6.25 ; 10 bags meal, \$14 . . .	37.35

1891.

Jan. 12.	10 bags meal, \$13.50 ; 8 bags oats, \$10 ; 1,200 lbs. shorts, \$15.80 . .	39.30
Feb. 23.	12 bags corn, \$16.20 ; 2 bags oats, \$2.70 ; bag salt, 90c . . .	19.80
Mar. 28.	1,700 lbs. shorts, \$24.15 ; 9 bags corn, \$14.30 ; 12 bags oats, \$17.30 . . .	55.75
April 30.	30 bags meal, \$52 ; 7 bags oats, \$10.35 ; 800 lbs. shorts, \$11.20 ; 2 casks lime, \$2.40 . . .	75.95
May 26.	13 bags corn, \$20.80 ; 15 bags oats, \$21.95 ; 800 lbs. bran, \$11.20 . . .	53.95
July 28.	1,600 lbs. shorts, \$19.60 ; 20 bags meal, \$29.50 ; 14 bags oats, \$17.90 . .	67.00
Aug. 28.	21 bags meal, \$33.10 ; 25 bags oats, \$29.50 ; 400 lbs. shorts, \$4.80 ; salt, 69c . . .	68.09
Sept. 29.	1,690 lbs. shorts, \$18.27 ; 39 bags meal, \$60.60 ;	

23 bags oats, \$24.20;
 250 lbs. linseed meal,
 \$4.38 \$107.45

\$582.99

THE AMERICAN BOOK CO.

1890.

Dec. 9. For 8 doz. writing books . . . \$6.15

C. H. HUTCHINSON.

1890.

Oct. 3. For 158 ft. pipe, \$7.93; cutting
 pipe, \$1.60 . . . \$9.53

1891.

Mar. 10. 139½ ft. pipe, \$6.98;
 labor, 80c . . . 7.78

 \$17.31

J. F. WOODBURY & CO.

Mar. 10. For shoeing horses from Oct. 15,
 1890, to Mar. 30, 1891 . . . \$14.75

G. H. BIXBY.

1890.

Dec. 31. For 30 pullets \$22.50

CARL E. YORK.

1890.

Oct. 6. For 6 lbs. steak, \$1.50; 3 qts.
 oysters, \$1.35; 3 lbs.
 crackers, 30c; grapes,
 45c \$3.60
 18. 2 qts. oysters, 90c; 2 lbs.
 crackers, 24c; 339 lbs.
 sugar, \$23.93 . . . 25.07
 20. 50 lbs. crackers, \$2.75; 6
 lbs. pepper, \$1.30; 20
 lbs. coffee, \$7.60 . . . 11.65

Oct. 25.	For $8\frac{3}{4}$ lbs. fowl, \$1.59 ; grapes, 35c ; salt, 15c ; 2 doz. eggs, 48c ; $10\frac{1}{2}$ lbs. beef, \$2.10	\$4.67
29.	$12\frac{1}{2}$ lbs. fowl, \$2.13 ; grapes, 65c ; $1\frac{1}{2}$ doz. eggs, 45c	3.23
Nov. 15.	$15\frac{1}{4}$ lbs. chicken, \$3.35 ; grapes, 75c ; trucking, \$1.16	5.26
24.	raisins, \$1 ; citron, \$1 ; soda, \$1 ; meal, \$1 ; sugar, \$6 ; 12 chimneys, 60c	10.60
	47 lbs. crackers, \$2.59 ; poultry dressing, \$2	4.59
25.	30 lbs. raisins, \$2.55 ; apples, \$1.75 ; 4 qts. cranberries, 50c	4.80
Dec. 10.	68 lbs. tea, \$13.60 ; 30 lbs. coffee, \$2.70 ; 357 lbs. sugar, \$21.87	38.17
25.	295 lbs. coffee, \$26.55 ; popcorn, 60c ; grapes, 50c ; 256 lbs. salt, \$1.30	28.95
Jan. 1.	12 lbs. coffee, \$4.32 ; 6 lbs. chocolate, \$2.70 ; $17\frac{1}{4}$ lbs. turkey, \$3.45	10.47
29.	$9\frac{3}{4}$ lbs. beef, \$1.95 ; 8 lbs. chicken, \$1.44 ; 4 lbs. crackers, 24c ; matches, 15c	3.78
Feb. 2.	$29\frac{3}{4}$ lbs. mutton, \$2.98 ; 361 lbs. sugar, \$23.46 ; insect powder, \$1	27.44
7.	$11\frac{1}{2}$ lbs. chicken, \$2.07 ; 2 qts. oysters, 80c ; $29\frac{1}{2}$ lbs. crackers, \$5.02 ; matches, 16c	8.05

Feb. 11.	For 33 $\frac{3}{4}$ lbs. turkey, \$6.75 ; poultry dressing, 50c ; 3 lbs. sugar, 27c	\$7.52
16.	17 lbs. beef, \$3.40 ; 6 lbs. sausage, 60c ; 1 qt. oysters, 40c ; 20 lbs. crackers, \$3.60	8.00
19.	16 lbs. fish, \$3.20 ; 16 $\frac{7}{8}$ lbs. turkey, \$3.37 ; 15 $\frac{3}{4}$ lbs. beef, \$2.77	9.34
28.	17 $\frac{3}{4}$ lbs. turkey, \$3.90 ; 3 qts. oysters, 80c ; 2 lbs. crackers, 20c	4.90
Mar. 10.	6 lbs. tea, \$1.20 ; 4 doz. oranges, \$1.10 ; 10 lbs. nuts, 50c ; vanilla, \$1	3.80
13.	6 lbs. cr. tartar, \$2.10 ; 6 lbs. soda, 48c ; 3 lbs. flax seed, 48c	3.06
25.	12 $\frac{3}{4}$ lbs. beef, \$2.31 ; 23 lbs. ham, \$2.30 ; 6 $\frac{1}{4}$ lbs. sausage, 63c ; apples, 90c	6.14
30.	12 lbs. mustard, \$3.60 ; 7 lbs. cassia, \$1.40 ; 10 lbs. currants, 70c ; 2 lbs. nutmeg, \$1.80	7.50
	1 box raisins	2.75
April 1.	12 oranges, 35c ; 12 lemons, 15c ; 82 lbs. tea, \$14.76 ; wicks, 10c	15.36
8.	2 pork bbls., \$1.50 ; 56 lbs. salt, \$1.95 ; 1 bbl. sugar, \$12.35	15.80
13.	49 $\frac{1}{2}$ gals. molasses, \$16.20 ; box raisins, 72c ; apples, 33c ; bbl. salt, \$3.25	20.50

April 15.	For 4½ lbs. fowl, 81c; 357 lbs. sugar, \$15.17; 10 lbs. coffee, \$3.20 . . .	\$19.18
22.	2½ lbs. chicken, \$4.73; apples, 25c; 2 doz. oranges, 80c . . .	5.78
May 7.	5 lbs. beef, \$1; 24 bananas, 60c; 4½ lbs. fish, 51c; apples, 40c . . .	2.51
	12 lbs. coffee, \$4.64; stove polish, 50c; chimney, 8c . . .	5.22
11.	144 lbs. beef, \$17.28; 2 boxes berries, 40c; strainer, 5c . . .	17.73
16.	50 lbs. ev. apples, \$8.50; 6½ lbs. fish, \$2.35; berries, 40c . . .	11.25
28.	6 lbs. sausage, 60c; 5 lbs. salt petre, 90c; lemons, 59c . . .	2.09
June 2.	6½ lbs. beef, \$1.30; plants, 90c; berries, 40c; bbl. meal, \$7.50 . . .	10 10
8.	50 lbs. lard, \$4.25; 6 lbs. cr. tartar, \$2.10; 5 lbs. tea, \$2.35; 5½ lbs. steak, \$1.10 . . .	9.80
15.	33½ lbs. butter, \$6.70; 7¾ lbs. beef, \$1.55; ½ box lemons, \$3 . . .	11.25
16.	½ box oranges, \$2.50; bunch bananas, \$2; veal, 35c . . .	4.85
17.	1 bu. potatoes, \$1.35; 5 lbs. soda, 40c; vanilla, \$1 . . .	2.75
July 4.	1 pail coffee, \$2.50; 45 lbs. crackers, \$2.48; 3 melons, \$1.30 . . .	6.28

July 14.	For 7 $\frac{3}{4}$ lbs. steak, \$1.93; 4 bu. potatoes, \$5.30; 4 doz. eggs, 88c	\$8.11
15.	$\frac{1}{2}$ box lemons, \$3.50; 10 boxes berries, \$1.88; 2 boxes cherries, 30c . .	5.68
16.	9 lbs. lamb, \$2.52; melon, 40c; 11 boxes berries, \$1.17	4.09
25.	2 bbls. sugar, \$25.08; 10 lbs. fowl, \$2; box raisins, \$2; 6 lbs. ginger, \$1 . .	30.08
27.	1 lb. chocolate, 45c; vanilla, \$1; 6 packages gelatine, 90c; insect powder, 40c	2.75
Aug. 1.	$\frac{1}{4}$ bu. berries, 80c; 4 melons, \$1.35; 12 bananas, 25c; 4 doz. pears, 80c . .	3.20
6.	2 $\frac{1}{2}$ lbs. steak, 63c; 4 doz. lemons, 90c; 2 pine-apples, 33c; 2 lbs. tea, \$1.50 . .	3.36
15.	12 lbs. coffee, \$4.32; bar Castile soap, 55c; 5 $\frac{3}{4}$ lbs. steak, \$1.04	5.91
26.	1 bbl. sugar, \$11.94; 350 lbs. salt, \$10.50; 6 lbs. sausage, 72c	23.16
Sept. 11.	8 $\frac{1}{4}$ lbs. fowl, \$1.65; matches, 16c; 3 baskets grapes, \$1.40	3.21
18.	2 lbs. tea, \$1.40; 5 $\frac{7}{8}$ lbs. steak, 97c; 2 doz. bananas, 50c	2.87
30.	1 bbl. sweet potatoes, \$3; 12 lbs. coffee, \$4.20; 6 lbs. fish, 60c	7.80

 \$504.01

G. W. DODGE.

1890.

Oct. 24.	For 24 prs. rubbers, \$5.76 ; 19 prs. boots, \$24 . . .	\$29.76
Nov. 13.	26 prs. shoes, \$30.60 ; 13 prs. boots, \$34.25 . . .	64.85

1891.

Mar. 28.	8 prs. shoes, \$10.75 ; 1 pr. rubber boots, \$3 ; slip- pers, 65c	14.40
April 1.	2 prs. boots, \$4.25 ; 12 boxes blacking, 80c ; 6 brushes, \$1.50	6.55
June 15.	1 pr. boots, \$1.25 ; 3 prs. shoes, \$4	5.25
Sept. 9.	8 prs. shoes, \$8.25 ; 1 pr. rubber boots, \$2.25 ; 3 prs. boots, \$3.75	14.25
		<hr/> \$135.06

MANCHESTER HEATING AND LIGHTING CO.

For repairing steam pipes from

April 2, 1890, to Nov.

10, 1890 \$16.32

1890.

Oct. 7.	12 lamps, \$4.20 ; lantern, \$2.65 ; 3 doz. wicks, 20c ; 12 chimneys, 75c	7.80
Dec. 12.	1 stove, \$8 ; set stove lin- ings, \$1	9.00
Sept. 30.	labor and stock putting in 10 water closets	1,085.90
		<hr/> \$1,119.02

FRED T. DUNLAP.

Nov. 30.	For 79 $\frac{370}{240}$ tons coal	\$356.27
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E. M. SLAYTON.

1890.

Oct. 4.	For 1 bbl. pork, \$13.50 ; 2 bags beans, \$12.86 ; 100 lbs. lard, \$7.50	\$33.86
9.	50 lbs. cheese, \$5.50 ; 373 lbs. butter, \$64.68 . .	70.18
Nov. 16.	1 case eggs, \$12.25 ; 6 bbls. sweet potatoes, \$12.50 ; 54 lbs. cheese, \$6.48 . .	31.23
26.	130½ lbs. butter	20.59

1891.

Jan. 28.	50 lbs. lard, \$3.75 ; 74 lbs. butter, \$17.20 ; 2 bags beans, \$11.45	32.40
Feb. 17.	1 case eggs, \$9.72 ; 72 lbs. butter, \$17.40 ; 49 lbs. cheese, \$5.88 ; 2 bags beans, \$13.24	46.24
Mar. 4.	54 lbs. butter, \$16.88 ; case eggs, \$5.70 ; case apples, \$8.50	31.08
28.	2 bbls. beans, \$24.58 ; 50 lbs. cheese, \$6.50	31.08
April 27.	7 bags beans, \$47.39 ; 73 lbs. butter, \$17.52	64.91
June 23.	100 lbs. butter, \$14 ; 2 bags beans, \$13.94 ; 9 bu. potatoes, \$10.35 ; 1 cheese, \$4	42.29
July 13.	50 lbs. cheese, \$4.50 ; 38 lbs. lard, \$3.04 ; 147 lbs. butter, \$29.13	36.67
31.	1 case eggs, \$6 ; 50 lbs. lard, \$4 ; 1 bbl. pork, \$15.50	25.50

Aug. 14.	For 2 bags beans, \$14.62; 51 lbs. cheese, \$4.59; 127½ lbs. butter, \$25.05 . . .	\$44.26	
Sept. 26.	4 bags beans, \$28.89; 162 lbs. butter, \$37.54 . . .	66.43	
		<hr/>	\$576.72

J. H. WIGGIN & CO.

1891.

Oct. 25.	For 2 bbls. sugar, \$43.43; 46 lbs. crackers, \$2.64; 24 cakes yeast, 48c . . .	\$46.55	
Nov. 3.	60 lbs. tea, \$12; 92 lbs. codfish, \$5.98; matches, 24c; 2 bags salt, \$1.30 . . .	19.52	
5.	46 gals. vinegar, \$9.66; 3 bbls. flour, \$18; 20 lbs. coffee, \$7.80; yeast, 24c . . .	35.70	
26.	2 bags salt, \$1.30; 1 lb. nut- megs, 90c; 12 lemons, 34c . . .	2.54	
Dec. 10.	8 gals. molasses, \$2.88; 24 packages wheat, \$3.25; bag salt, 70c . . .	6.83	
15.	20 lbs. coffee, \$7.60; 52½ gals. molasses, \$18.38; 2 bbls. sugar, \$42.96 . . .	68.94	
24.	49 lbs. crackers, \$2.70; 46 lbs. raisins, \$5.06; box soap, \$3.40 . . .	11.16	
30.	20 lbs. coffee, \$7.40; yeast, 40c . . .	7.80	

1891.

Jan. 2.	90 lbs. codfish, \$5.85; box soap, \$4; 20 lbs. coffee, \$7.40 . . .	17.25	
Feb. 5.	1 bbl. sugar, \$22.60; 49 lbs. crackers, \$2.70; matches, 24c . . .	25.54	

Feb. 25.	For 60 lbs. tea, \$12; box pep- pers, \$2; 340 lbs. sugar, \$21.70; yeast, 24c . . .	\$35.94
Mar. 27.	12 lbs. coffee, \$4.32; 40 lbs. starch, \$3.60; 3 bbls. flour, \$19.50 . . .	27.42
April 4.	2 lbs. tea, \$1; bbl. crackers, \$2.57; 335 lbs. sugar, \$15.08	18.65
25.	50 lbs. coffee, \$6.25; box soap, \$4; 6½ lbs. crack- ers, 98c	11.23
27.	330 lbs. sugar, \$14.45; 12 lbs. coffee, \$4.44; bag salt, 65c	19.54
May 18.	40 lbs. fish, \$4; matches, 24c; 3 bbls. flour, \$19.50	23.74
June 25.	6 lbs. coffee, \$1.80; bbl. crackers, \$2.48; 59 lbs. tea, \$12.39; 46 lbs. starch, \$3.45	20.12
July 11.	24½ lbs. codfish, \$1.84; 3 bags salt, \$1.50; 10 lbs. coffee, \$3.86; 5 lbs. soda, 30c	7.50
Aug. 1.	1 box soap, \$4.50; 100 lbs. coffee, \$8; 45 lbs. crack- ers, \$2.70; 50 lbs. tea, \$17.50	32.70
4.	100 lbs. codfish, \$7.50; matches, 45c; 330 lbs. sugar, \$14.85	22.80
13.	40 lbs. starch, \$2.40; 6 lbs. cr. tartar, \$2.25; 50 lbs. rice, \$3.50; 50 lbs. lard, \$3.75	11.90

Sept. 23.	For 12 lbs. coffee, \$4.50 ; 45 gals. vinegar, \$9 ; 2 bbls. sugar, \$30.88 . . .	\$44.38
	237 loaves of bread from Sept. 25, to Sept. 30, 1891	16.59
		<hr/> 534.34
	Credit, vegetables . . .	18.28
		<hr/> \$516.06

E. C. SMITH & CO.

1890.

Oct. 18.	For 4 bottles cough medicine, \$2.70 ; 1 bottle Fellows' hypophosphites, \$1.15 .	\$3.85
Nov. 3.	1 pt. rhubarb, 50c ; 3 bot- tles sarsaparilla, \$2.25 ; Herald, 5c	2.80
20.	Fellows' syrup, \$1.15 ; zinc ointment, 10c ; 2 pre- scriptions, 55c	1.80
Dec. 6.	carbolic and sulphuric acid, 50c ; 1 lb. insect powder, 40c . . . . .	.90
12.	$\frac{1}{2}$ lb. chlorate potassa, 25c ; 2 prescriptions, 35c . .	.60
27.	2 boxes cuticura ointment, 80c ; nitre, 25c	1.05

1891.

Jan. 24.	vaseline, 50c ; soap, 25c ; hive syrup, 35 ; Herald, 5c	1.15
Feb. 23.	1 gal. alcohol, \$2.50 ; beef, iron, and wine, 75c ; 5 prescriptions, \$1.45 . .	4.70
Mar. 11.	1 qt. glycerine, 50c ; tr. iodine, 30c ; sarsaparilla, 75c	1.55

Mar. 26.	For 14 lbs. flax-seed meal, 70c ; beef, iron, and wine, 75c	\$1.45
30.	1 gal. witch hazel, \$1 ; 2 prescriptions, \$3.25	4.25
April 9.	vaseline, 50c ; 1 pt. olive oil, 55c ; 3 prescriptions, \$1.80 ; Globe, 5c	2.90
23.	4 bottles sarsaparilla, \$3 ; 2 bottles cherry pectoral, \$1.50	4.50
May 5.	5 prescriptions, \$4.35 ; Globe, 5c ; 2 bottles sar- saparilla, \$1.50	5.90
June 1.	2 bottles cherry pectoral, \$1.50 ; 3 prescriptions, \$2.05	3.55
20.	1 bottle Fellows' syrup, \$1.15 ; senna, 25 ; check- erberry, 25c	1.65
	1 box pills, 25c ; Globe, 5c	.30
July 1.	3 bottles sarsaparilla, \$2.25 ; 1 gal. witch hazel, \$1 ; Globe, 5c	3.30
Aug. 19.	$\frac{1}{2}$ lb. soap bark, 25c ; 2 oz. sodamints, 20c ; 2 bottles cherry pectoral, \$1.50	1.95
Sept. 29.	1 gal. witch hazel, \$1 ; gal. alcohol, \$2.50 ; 2 Globes, 10c	3.60
		<hr/> \$51.75

CLOUGH & CO.

1890.

Sept. 17.	For 32 lbs. ham, \$3.58 ; 38 lbs. lard, \$2.85	\$6.43
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1891.

Feb. 11.	29 lbs. lard, \$2.90 ; 105 lbs. ham, \$9.45 ; basket, \$1	13.35
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Aug. 1.	For 48 lbs. ham, \$5.04 ; basket,	
	50c	\$5.54
		<hr/>
		\$25.32

WINGATE & GOULD.

1891.

April 25.	For 16 prs. shoes	\$16.90
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NEW ENGLAND TELEPHONE AND TELEGRAPH CO.

For telephone rental and service from Oct.

1, 1890, to Sept. 1, 1891	\$55.56
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L. M. FRENCH, M. D.

For professional attendance on inmates

from May 27, 1890, to April 2, 1891	\$71.00
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E. R. COBURN & CO.

For Ladies' Home Journal and

Golden Days from Oct. 1,

1890, to Feb. 1, 1891	\$1.65
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Harper's Magazine from

Oct. 1, to Dec. 31, 189190
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postage15
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1891.

Mar. 9.	12 slates, 84c ; 12 algebras,	
	\$7.80 ; picture frame, \$7 ;	
	12 boxes crayons, \$1.20	16.84
		<hr/>
		\$19.54

MANCHESTER HARDWARE CO.

1890.

Oct. 9.	For 3 knives, 75c ; ash can,	
	\$2.50 ; sponge, 15c ; scale	
	weight, 25c	\$3.65
Nov. 4.	1 razor strop, 20c ; 3 lan-	
	tern globes, 30c ; 12 rope	
	halters, \$1.35	1.85

Nov. 5.	2 doz. rings and staples, 60c; 1 gro. screws, 35c; 8½ lbs. hinges, 51c. .	\$1.46
8.	1 hammer, 15c; 6 staples, 5c; 1½ lbs. hinges, 9c; hasp and staple, 8c. .	.37
15.	2 rasps, \$1.24; stable broom, 38c; 6 wash- boards, \$1.25; latch, 15c	3.02
18.	2 clothes lines, 70c; 4½ lbs. black lead packing, \$1.85	2.55
22.	2 lts. glass, 84c; ball twine, 5c; lock and knob, 33c .	1.22
24.	1 gro. screws, 40c; 3 rolls roofing paper, \$14.25; 3 lbs. nails, 15c . .	14.80
Dec. 3.	1 file, 45c; 2 latches, 16c; 1 gro. screws, 90c . .	1.51
1891.		
May 20.	4 packages kalsomine, \$2; ¾ bu. corn and bag, \$2.08	4.08
July 25.	5⅔ doz. hay caps, \$6.44; 1 pr. hinges, 15c; 2 hitch ropes, 50c . . .	7.09
Aug. 29.	1½ lbs. solder, 24c; 12 bas- kets, \$4.31; 4 bolts, 40c; 50 lbs. lead, \$3.63 .	8.58
Sept. 9.	23½ lbs. rope, \$2.47; 4 corn hooks, \$1.08; 12 ox balls, \$1; 12 cards, 67c	5.22
	12 shoe knives, \$1; 6 brushes, 88c; 2 hatchets, 42c; quire sand paper, 15c	2.45
	94 lbs. lath yarn, \$8.46; razor, 50c; molasses gate, 20c	9.16

Sept. 12.	12 brooms, \$1.75; 2 apple parers, \$1.15; pail, 30c; force pump, \$7.50 . . .	\$10.70	
19.	1 pr. brackets, 20c; plow point, 75c; 5 ft. rubber hose, 75c . . .	1.70	
		<hr/>	\$79.41

A. C. WALLACE.

1890.

Sept. 23.	For sawing 11,870 ft. logs, \$29.67; moving to mill, \$6 . . .	\$35.67	
	Credit for 2,486 ft. logs . . .	27.34	
		<hr/>	\$8.33

FRED E. RICHARDS.

For 436 cans milk from Oct., 1890, to Mar. 16, 1891 . . .	\$156.96
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DAVID FLANDERS.

Nov. 11.	For 1 case eggs, butter . . .	\$17.38
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I. S. YORK.

1890.

	For harness repairs from Aug. 1 to Nov. 19, 1890 . . .	\$9.70	
Nov. 11.	1 blanket, \$5; 2 rope ties, 40c; 2 whips, \$2; 2 halters, \$1.50 . . .	8.90	

1891.

Feb. 17.	2 hame straps, 70c; oiling and repairing harnesses, \$3.40 . . .	4.10	
May 28.	1 rein, 65c; pr. fronts, \$1.25; 4 sweat collars, \$2.80 . . .	4.70	

June 22. 19	For rings, \$3.90; repairs, 15c	\$4.05	
July 6.	2 rope ties, 40c; repairs on harnesses, \$4.85	5.25	
Sept. 21.	4 halters, \$2; 2 ties, 40c; whip, \$1.50	3.90	
		<hr/>	\$40.60

FLEISCHMANN & CO.

For 107 $\frac{3}{4}$ lbs. yeast, from Oct. 1, 1890, to Sept. 1, 1891	\$37.81
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GEORGE W. CHAPMAN.

For shoeing horses from Oct. 2, 1890, to Sept. 29, 1891	\$118.57
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L. T. MEADE.

1890.	For Boston Daily Journal from Oct. 1, 1890, to July 1, 1891	\$4.50	
Dec. 1.	3 boxes penholders, \$1.87; 3 doz. slates, \$3; bottle ink, 75c	5.62	
1891.			
Mar. 25.	2 bottles ink, \$1.62; 3 boxes pens, \$1.75; gro. slate pencils, \$1.25; book, 40c	5.02	
		<hr/>	\$15.14

E. S. NEWTON.

	For 147 lbs. fish, \$11.18; 30 lbs. steak, \$2.40, in Oct., 1890	\$13.58
Nov. 21.	26 lbs. fish, \$4.70; 25 lbs. steak, \$2.50; 1 gal. oys- ters, \$1.40	8.60

Dec. 6.	For 59 lbs. fish, \$4.05 ; 1 gal. oysters, \$1.40 . . .	\$5.45
26.	62 lbs. fish, \$6.10 ; 9 lbs. steak, \$1.08 . . .	7.18
	239½ lbs. fish, \$17.91 ; 3 qts. oysters, in Jan., 1891 . .	19.11
	259½ lbs. fish in Feb. . .	15.95
	148½ lbs. fish in March . .	12.60
1891.		
April 3.	105 lbs. salt fish, \$5.25 ; 13 lbs. fish, \$2.34 ; 37 lbs. steak, \$2.72 . . .	10.31
29.	97½ lbs. fish, \$5.40 ; 2 gals. oysters, \$7 . . .	12.40
	259½ lbs. fish in May . .	21.34
	223 lbs. fish in June . .	18.28
	251 lbs. fish in July . .	22.01
	201 lbs. fish in Aug. . .	16.90
	190½ lbs. fish, \$16.48 ; 2 qts. oysters, in Sept. . .	17.28
		<hr/> \$200.99

E. P. RICHARDSON.

1890.		
Nov. 10.	For insurance on barn and shop . . .	\$37.50

N. DECOTEAU.

For blacksmith repairs on wagons, sleighs, sleds, chairs, carts, from Sept. 2, 1890, to Sept. 30, 1891 . . .	\$178.45
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S. C. FORSAITH MACHINE CO.

Oct. 29.	For 60 ft. boiler tubes, \$17.45 ; 1,297 ft. lumber, \$23.53 ; labor, \$6.40 . . .	\$47.38
Nov. 29.	2 doors and frames, \$6.76 ; 48 boiler tubes, \$199.44 ; labor, \$75.35 . . .	281.55

Nov. 29.	For labor and stock, repairing boiler from Dec. 12, 1890, to July 1, 1891 . . .	\$44.02	
		<hr/>	\$372.95

ROBERT B. NEAL.

Jan. 10.	For 2 bbls. apples		\$6.00
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W. F. HUBBARD.

1890.

May 5.	For 2 door frames, \$3; planing and jointing lumber, \$15	\$18.00	
June 26.	24 pickets, 96c; boards, \$2.20; 3 chests, \$6.50 .	9.66	
Oct. 2.	1 sash, \$2; 436 ft. boards, \$9.40; 12 window bands, 60c	12.00	
Dec. 12.	256 ft. pine, \$10.98; 10 lbs. nails, 30c; 2 tables, \$8; 24 parting beads, 48c	19.76	

1891.

Mar. 19.	100 ft. matched boards, \$2; 24 pickets, \$1.44 . . .	3.44	
June 27.	10 ft. ash and oak, 40c; sawing and planing, 35c .	.75	
	1 door and frame, \$3.50; casings, caps, and win- dow frame, \$2.84 . . .	6.34	
	2 screen doors, \$4.50; 12 window blinds, \$7.80; blind trimmings, \$1.68 .	13.98	
		<hr/>	\$83.93

MANCHESTER ONE PRICE CLOTHING CO.

1890.

July 1.	For 2 $\frac{5}{8}$ doz. hats, \$12; tie, 25c; umbrella, 75c; 1 pr. pants, \$2.	\$15.00
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Dec.	6.	For 2 prs. gloves, \$1; 1 pr. mittens, 25c . . .	\$1.25
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1891.

Feb.	23.	7 overcoats, \$15.50; 17 coats, \$41; 3 prs. gloves, \$1.50 . . .	58.00
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April	27.	2 suits, \$17.50; 2 hats, \$2	19.50
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June	25.	22 boxes collars . . .	2.70
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\$96.45

KILLEY & WADLEIGH.

1890.

Oct.	3.	For 2 doz. cow ties, 38c; 28 lbs. rope, \$4.76; 13½ lbs. weights, 68c . . .	\$5.82
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	13.	2 lts. glass, 12c; rope, 10c; 12 brooms, \$2; 12 mop sticks, \$1 . . .	3.22
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Nov.	7.	1 lock, 30c; padlock, 25c; hasp, 8c; 4½ ft. ground glass, 81c . . .	1.44
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Dec.	4.	1 bit brace, 50c; bit, 28c; key hole saw, 25c; 6 bolts, 8c . . .	1.11
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	19.	13 lbs. putty, 52c; 12 sash fasts, 75c; whip, \$1.25; gro. sand paper, 20c . . .	1.72
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1891.

Jan.	5.	4¼ lbs. cotton line, \$1.07; 2 gals. turpentine, \$1.20; 2 gals. oil, \$1.44 . . .	3.71
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	6.	1 gal. dryer, 75c; 100 lbs. lead, \$7.75; can, 40c; 2 lbs. paint, 78c . . .	9.68
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	12.	1 broom, 45c; 13 bolts, 24c; pr. clippers, \$3.50; pr. butts, 15c . . .	4.34
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Feb. 28.	For 1 mane comb, 10c; 14 lbs. glass, 99c; 2 prs. chain lengtheners, 76c . . .	\$1.85
Mar. 7.	6 hooks, 30c; garden seeds, 75c; 8 bolts, 40c . . .	1.45
23.	14 brooms	2.90
April 7.	1 pr. pruning shears, 50c; sponge, 25c; 2 lbs. lead, 24c . . . . .	.99
25.	2 hammers, 75c; gloves, \$1; seeds, \$4.15; 6 lanterns, \$2.25	8.15
May 1.	3 lbs. glass, 79c; 2 rakes, \$1.10; 3 lbs. nails, 12c . . .	2.01
June 8.	1 chisel, 30c; $\frac{3}{4}$ copper wire, 23c; paint brush, 40c . . .	.93
9.	20 ft. netting, 15c; 10 lbs. lath yarn, \$1; 6 files, 90c; halter, 20c	2.25
20.	2 sets knives and forks, \$2; 2 oilers, 24c; 2 wrenches, 60c; 2 bolts, 8c	2.92
July 1.	12 rakes, \$2.75; 8 hay forks, \$2.25; 3 scythes, \$1.65; 5 rifles, \$1.25; 53 bolts, 86c	7.76
3.	1 pr. gloves, \$1; $4\frac{1}{2}$ lbs. lead pipe, 30c; $\frac{1}{2}$ gal. oil and can, 85c	2.15
30.	12 brooms, \$2; whip, 25c; box glass, \$3. 20; $7\frac{1}{2}$ oz. sponge, \$1.40	6.85
Aug. 3.	6 shovels, \$3.75; 12 pails, \$1.75; chamois, 60c; $\frac{1}{4}$ gal. oil, 40c	6.50

Aug. 26.	For 1 plow cutter and fasts, 85c ; 3 tedder teeth, \$3 ; pr. brackets, 37c . . .	\$4.23	
Sept. 18.	2 razors, \$1 ; pr. shears, 62c ; washers, 5c ; pr. lamp trimmers, 42c. . .	2.09	
28.	1 bu. grass seed and bag . . .	5.90	
	10 lbs. Paris green, \$2.30 ; 12 shoe knives, \$1.25 ; sponge, 80c	4.35	
		<hr/>	\$94.31

THOMAS A. LANE.

1890.

Nov. 24.	For labor and stock laying steam and water pipes to barn . . .	\$114.38	
	repairing steam pipes from Jan. 28, to Feb. 27, 1891 . . .	15.58	

1891.

June 10.	labor and stock repairing steam pipes and sewer . . .	97.86	
Sept. 11.	428 lbs. lead pipe, \$29.96 ; labor and stock piping, \$6.44	36.40	
		<hr/>	\$264.22

EAMES BROS.

1890.

Nov. 20.	For 3 prescriptions	\$1.30	
Mar. 28.	4 prescriptions, 85c ; pt. lime water, 20c ; magic atomizer, \$1	2.05	
	15 prescriptions	4.35	
		<hr/>	\$7.70

HORACE MARSHALL.

1890.

Dec. 10.	For 4 bu. peas, \$5.60 ; $8\frac{2}{3}$ bu. beans, \$20.89	\$26.49	
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Dec. 27. For 40 lbs. turkey, \$5.20; 50		
lbs. chicken, \$5.50	.	\$10.70
		<hr/>
		\$37.19

THE PUBLIC MARKET AND PACKING CO.

1890.

Oct. 3. For 6½ lbs. lamb, 75c; 16 lbs.		
beef, \$2.36; 125 lbs.		
butter, \$24.65	.	\$27.76
Dec. 15. 85 lbs. butter, \$21.87; 57		
lbs. chicken, \$6.27	.	28.14

1891.

Jan. 19. 85 lbs. butter, \$18.16; 22		
lbs. cheese, \$2.20	.	20.36
Feb. 20. 83 lbs. butter, \$16.94; box		
oranges, \$2.85	.	19.79
Mar. 27. 187 lbs. butter, \$36.77; 30		
lbs. jam, \$2.70; 30 doz.		
eggs, \$5.70	.	45.17
April 18. 101 lbs. butter, \$21.38; 2		
fowl, \$1.92; 12 oranges,		
15c	.	23.45
May 29. 11 lbs. chicken, \$2.07; 63		
lbs. butter, \$15.26	.	17.33
June 19. 1 case eggs, \$5.40; 2 pine-		
apples, 25c; 6 boxes ber-		
ries, 50c	.	6.15
July 28. 2 doz. eggs, 50c; 2 melons,		
95c; 86 lbs. butter,		
\$18.92	.	20.37
Sept. 4. 4 baskets peaches	.	3.75
		<hr/>
		212.27
Credit 1,540 lbs. hay	.	12.32
		<hr/>
		\$199.95

HEAD & DOWST.

1890.			
Sept. 23.	For labor, lumber, etc., building barn and shed . . .	\$402.46	
1891.			
Mar. 13.	360 ft. spruce . . .	5.76	
		<hr/>	\$408.22

WOMAN'S CHRISTIAN TEMPERANCE UNION.

1890.			
Nov. 4.	For 55 temperance catechisms .	\$2.75	
April 24.	religious services Sunday for 1 year . . .	150.00	
		<hr/>	\$152.75

CHARLES KIMBALL & CO.

1891.			
Jan. 17.	For 10 bu. potatoes, \$11.50; 5 bags, 30c		\$11.80

OCTAVE BROCKEN.

1891.			
Jan. 21.	For 120 bu. potatoes . . .		\$123.00

PORTER BROS. & CO.

1891.			
Feb. 4.	For 1 great gross buttons, \$3.25; gross buckles, 27c . . .	\$3.52	
May 5.	1 great gross buttons and eyelets, \$3.25; 3 gross buckles, 45c. . .	3.70	
		<hr/>	\$7.22

J. M. & D. A. PARKER.

1891.			
Feb. 4.	For 3,130 ft. chestnut plank . . .		\$59.15

DARWIN A. SIMONS.

1891.			
Feb. 11.	For 1 box oranges . . .		\$3.00

JAMES H. BROWN.

1891.

Feb. 13.	For 15 days' labor painting, \$30; 1½ gals. varnish, \$3.75	\$33.75
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JAMES E. STONE.

1891.

Mar. 4.	For 4,140 lbs. straw	\$16.50
Aug. 7.	53 boxes blueberries, \$4.90; ½ bu. apples, 50c	5.40
21.	9¾ lbs. fowl, \$1.75; 27 boxes berries, \$2.16; bu. apples, 50c	4.41
Sept. 4.	16 lbs. poultry, \$3.36; 16 boxes berries, \$1.44	4.80
		<hr/> \$31.11

PETER HARRIS.

1891.

Jan. 24.	For keys and saw	\$2.80
Sept. 8.	repairing locks and keys	9.45
		<hr/> \$12.25

PETER GAINES & CO.

1890.

Nov. 10.	For 560 gals. soft soap	\$49.07
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A. W. BAKER.

1891.

Feb. 10.	For veterinary services	\$5.00
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LUNKENHEIMER BRASS MFG. CO.

Feb. 16.	For 12 glasses for boiler	\$0.85
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DAILY PRESS PUB. CO.

1891.

	For Daily Press from Nov. 1, 1890, to June 1, 1891	\$1.75
April 22.	advertising examination	4.00
		<hr/> \$5.75

FRANK H. CHALLIS.

For Weekly Budget from Jan. 1, 1891, to Jan. 1, 1892	\$1.50
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CAVANAUGH BROS.

1890.	
Mar. 4. For harness repairs	\$3.64

J. G. ELLINWOOD.

1891.	
April 8. For 4½ doz. photographs	\$8.00

A. F. CASWELL.

1891.	
Mar. 13. For 7½ tons coal	\$50.62

BLAKE & STEARNS.

1891.	
Feb. 3. For 248 yds. cassimere	\$208.00

BENJAMIN CURTIS.

1891.	
Mar. 18. For 1 Devon cow	\$55.00

NEW HAMPSHIRE BIBLE SOCIETY.

1891.	
Mar. 19. For 1 Bible, 42 Testaments and Psalms	\$9.30

WARD PARKER.

1891.	
Mar. 21. For 1 Devon bull	\$20.00

MORRILL & SANBORN.

1891.	
Mar. 21. For 5 cows and heifers	\$158.00

GEORGE W. LAMPER.

1891.	
Mar. 22. For 1 month labor	\$20.00

FRED L. HOWE.

1891.

Mar. 22. For boarding Fred K. Howe during sick-	
ness	\$15.00

C. H. DANA.

1891.

Mar. 10. For 1 cattle punch	\$1.50
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JOHN B. SANBORN.

1891.

Mar. 23. For 1 pr. oxen, 11 cows, 2	
bulls, 5 heifers, 1 calf .	\$825.00
24 lbs. butter	6.00
	<hr/> \$831.00

W. F. PAGE.

1891.

Mar. 27. For 600 ft. oak plank, \$8.40; 401½ cords	
wood, \$1,405.25	\$1,413.65

E. T. JAMES.

For stabling horses from Oct. 3, 1890, to	
Sept. 17, 1891	\$27.25

SEARS & COMPANY.

1891.

Jan. 17. For 1 hhd. molasses, \$44.02;	
100 lbs. rice, \$5.70; 50½	
lbs. coffee, \$16.41	\$66.13
1 box raisins, \$2; 6 lbs.	
tea, \$3.90; box pepper,	
\$1.80; box dates, \$2.93	10.63
3 bags salt, \$3.95; case	
peaches, \$5; 25 lbs.	
prunes, \$2.22; bbl. sugar,	
13.29	24.46
	<hr/> \$101.22

WINSLOW, RAND & WATSON.

Jan. 31.	For 1 bbl. coffee	\$27.61
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JAMES BRIGGS.

Mar. 28.	For 1 scoop, \$1 ; 6 bean pots, \$1.50 . . .	\$2.50
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ANTOINE DEROCHERS.

1891.

Dec. 8.	For soft soap	\$9.80
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W. P. GOODMAN.

1891.

Mar. 28.	For 1 pt. ink, 35c ; Elocutionist's Annual, 25c ; periodicals, \$2.85	\$3.45
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W. D. LADD & CO.

1891.

Mar. 31.	For 3 bbls. crackers	\$8.03
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J. HODGE.

1890.

May 10.	For 4 ft. sapling, 10c ; 10 prs. sash, \$5.50 ; labor, 10c	\$5.70
Oct. 3.	150 ft. window bands, \$1.13 ; 10 window frames, \$9	10.13
		<hr/> \$15.83

A. C. HOVEY.

1891.

Mar. 27.	For 2 dippers, 45c ; castings and repairs on range, \$4.80	\$5.25
April 16.	3 tin pails, \$2.20 ; 2 pans, 90c ; repairing cans, \$1.30	4.40
June 29.	3 sprinklers, \$2.15 ; 3 stop- pers, 30c	2.45
		<hr/> \$12.10

E. A. WALLACE, M. D.

For medical attendance on inmates to April

1, 1891 \$4.00

FREDERICK ALLEN.

1890.

Sept. 17. For 3 horse blankets . . . \$6.75

1891.

Mar. 28. 4 halters, \$1.87; harness
soap, 50c; 3 surcingles,
\$1; sponge, 15c . . . 3.52harness repairs from Dec.
24, 1890, to Mar. 23,
1891 5.25May 29. 1 whip, 35c; repairing har-
nesses, \$7.95 . . . 8.30July 7. 1 rope tie, \$1.20; 2 blankets,
\$1.30; 2 fly screens, \$1.20 . . . 2.7016. 2 carriage mats, \$3; whip,
25c; pad, 65c; 3 surcin-
gles, \$1.20 5.10

Sept. 17. repairs 45

\$32.07

INDIA ALKALI WORKS.

1891.

Jan. 21. For 2½ bbls. house savogran . . . \$55.72

MANCHESTER SLAUGHTERING AND RENDERING CO.

1891.

Feb. 2. For slaughtering 3 hogs . . . \$3.75

May 14. 1 ton fertilizer . . . 20.00

\$23.75

MANCHESTER STOCKING CO.

1891.

Jan. 10. For 47 doz. hose \$69.25

A. D. MAXWELL.

1891.

Feb. 27.	For ice to fill ice-house	\$15.00
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W. W. BARRETT.

1891.

Jan. 16.	For 6 bbls. apples, \$15.75; 45 lbs. butter, \$11.25	\$27.00
Feb. 7.	3 bbls. apples, \$12; 32 lbs. butter, \$9.60	21.60
Mar. 4.	41 lbs. lead pipe; drawing hay	5.60
16.	97 lbs. butter, \$29.10; 3 pigs, 31.20	60.30
April 20.	96 lbs. veal, \$9.60; 128 lbs. butter, \$38.40	48.00
June 23.	71 lbs. butter	17.75
July 7.	127 lbs. veal, \$11.40; 60½ lbs. butter, \$15.10	26.50
Aug. 22.	62 lbs. butter, \$18.60; 16 bu. apples, \$6.80	25.40
28.	139 lbs. butter, \$32.50; 620 lbs. beef, \$40.30	72.80
Sept. 8.	20 bu. apples, \$10; 17 lbs. butter, \$5.10; 10 bu. pears, \$16	31.10
14.	130 lbs. veal, \$13; 20 bu. apples, \$10	23.00
23.	510 lbs. beef, \$30.60; 32½ lbs. butter, \$9.75	40.35
		<hr/> \$399.40

C. L. B. PERKINS.

1891.

April 6.	For 6 cans maple syrup	\$6.75
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B. F. CLEVELAND.

April 13.	For 7 gals. maple syrup	\$5.60
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HENRY JOHNSON.

April 20. For killing and selling 1 ox . . . \$5.00

CHARLES B. DICKEY.

April 23. For 4,460 lbs. bedding . . . \$22.10

C. C. CURRIER.

For tuning organ and piano . . . \$3.50

JAMES ELLEMAN.

1891.

April 24. For 15 bottles insect powder, \$5; express,
75c . . . \$5.75

E. J. CARR.

1891.

April 15. For 26 qts. seed corn and beans . . . \$5.00

WINCHESTER FURNITURE CO.

1891.

April 18. For 120 school desks and chairs . . . \$308.00

RICE, SAYWARD & WHITTEN.

1891.

April 15. For 32 suits boys' clothes . . . \$112.00

N. J. WHALEN.

May 1. For 1 trunk . . . \$2.25

N. H. DEMOCRATIC PRESS CO.

April 22. For advertising examination . . . \$3.50

TELEGRAPH PUBLISHING CO.

April 25. For advertising examination . . . \$2.00

A. S. CAMPBELL & CO.

May 21. For printing 500 note circulars . \$1.75

Aug. 21. printing 600 bill heads,
\$2.25; 300 postals, 85c. 3.10

\$4.85

BOSTON HERALD CO.

May 10.	For advertising	\$9.38
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THOMAS KELLEY.

June 8.	For 2 bu. peanuts	\$3.25
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GEORGE HOLBROOK.

April 27.	For shingling barn, \$10.62; setting up desks, \$15.75; stock, \$13.30	\$39.67
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EMPIRE LAUNDRY MACHINERY CO.

June 9.	For 1 washing machine, ex- tractor, mangle, 8 bar drying room, shafting, pulleys, etc.	.	.	.	\$1,000.00	
	Credit, freight	.	.	.	6.81	
					<hr/>	\$993.19

FITCHBURG STEAM ENGINE CO.

April 25.	For 1 eccentric strap	\$9.00
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W. FOSTER.

June 15.	For 30 lbs. butter	\$5.70
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W. G. LANDRY.

April 8.	For 8 loads stone	\$24.00
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REPUBLICAN PRESS ASSOCIATION.

April 21.	For advertising examination	\$4.00
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GLOBE NEWSPAPER CO.

1891.

June 12.	For advertising	\$9.00
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SHIRLEY & STUART.

1891.

May 1.	For 13 days' mason work, \$51.25; cartage and stock, \$13.60 . . .	\$64.85	
Aug. 25.	Mason work and stock . . .	45.55	
		<hr/>	\$110.40

MANCHESTER PRODUCE CO.

1891.

May 13.	For 6 bu. potatoes	\$6.90	
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CUMMINGS & CO.

1891.

April 4.	For 100 lbs. Phoenix lead	\$7.00	
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KIMBALL CARRIAGE CO.

1891.

May 26.	For 1 set harnesses, \$55; pole straps, \$1.75; rings, \$1.90; fronts, \$2 . . .	\$60.65	
July 16.	2 carriage robes, \$5; rosettes, 50c	5.50	
		<hr/>	\$66.15

FREDERICK C. DOW.

1890.

Nov. 28.	For 1 bunch strings, \$1.50; 58 prs. shoes, \$129.90; 17 prs. boots, \$42.50 . . .	\$173.90	
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1891.

Feb. 13.	3 prs. rubber boots, \$7.50; 27 prs. shoes, \$31.05 . . .	38.55	
May 16.	27 prs. boots, \$44.87; bunch strings, \$1.50 . . .	46.37	
		<hr/>	\$258.82

F. P. KIMBALL.

1891.

April 14.	For 44 suits, \$160; 1½ doz. shirts, \$4.50; 8 doz. suspenders, \$10; collars, \$2.40 . . .	\$176.90	
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A. SAWTELLE & CO.

1891.

June 11.	For 1 hhd. molasses, \$43.20 ; 1 case evaporated apples, \$7	\$50.20	
	25 lbs. coffee, \$7.75 ; 459 lbs. sugar, \$17.34 ; cart- ing, 63c	25.72	
Sept. 4.	5 bags salt, \$3.70 ; bbl. coffee, \$18 ; bag rice, \$6	27.70	
	1 can mustard, \$2.76 ; cart- ing, 35c	3.11	
		<hr/>	\$106.73

J. H. PIERCE & CO.

1891.

May 25.	For 80 lbs. tea, \$15.20 ; bbl. sugar, \$22.04	\$37.24	
Aug. 24.	2 bbls. syrup	38.68	
		<hr/>	\$75.92

HIGGINS BROS. CO.

1891.

Jan. 31.	For 4 window shades, \$4.09 ; 5 yds. opaque, 90c	4.99	
Mar. 11.	3 slop pails, \$1.14 ; cover- ing transom, 20c	1.34	
Aug. 27.	6 lanterns	3.00	
		<hr/>	\$9.33

C. E. COX.

1891.

May 19.	For 341 lbs. beef	\$33.25	
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P. C. CHENEY CO.

1891.

June 30.	For 1 Holstein bull	\$70.00	
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R. D. GAY.

1891.

April 27.	For 15 rolls paper, \$3 ; 25 yds. border, \$1.25 ; labor, \$4 ; flags, \$2	\$10.25	
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Sept. 21.	For 28 rolls paper, \$6.90; 48 yds. border, \$2.88; 3 shades, \$3; labor, \$8.98	\$21.76	
		<hr/>	\$32.01

DODGE & STRAW.

1891.

April 27.	For 26 prs. shoes	\$30.80
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BRADLEY FERTILIZER CO.

1891.

May 8.	For 1 $\frac{3}{8}$ tons fertilizer	\$48.00
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PIKE & HEALD.

Mar. 1.	For 1 measure, 42c; 2 tunnels, 57c; plug, 11c; coupling, 12c	\$1.22	
Sept. 28.	6 dippers, \$2.10; 2 pails, 84c	2.94	
		<hr/>	\$4.16

MOORE & PRESTON.

1891.

Sept. 26.	For 8 $\frac{2}{3}$ tons stove coal	\$60.25
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SANBORN CARRIAGE CO.

June 2.	For repairs on wagons	\$19.30
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JOHN CAVANAUGH.

June 26.	For upholstering chair	\$5.00
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STEARNS & JAMESON.

1891.

Mar. 1.	For 357 lbs. meat to May 9, 1891	\$24.97	
Sept. 30.	300 lbs. meat	25.22	
		<hr/>	\$50.19

R. E. WHEELER.

1891.

June 27.	For 666 lbs. beef	\$53.28
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J. J. ABBOTT.

1891.

April 28.	For 34 rolls paper, \$5.10 ; 46 yds. border,	
	\$3.68 ; labor, \$4.65	\$13.43

L. B. BODWELL & CO.

Jan. 23.	For 3 cords sawdust	\$3.00
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J. CAVAGNARO & CO.

July 2.	For 50 lbs. nuts, \$7 ; bu. peanuts, \$1.50 ;	
	2 bunches bananas, \$2	\$10.50

THOMAS F. COLLINS.

April 8.	For coffin and burial expenses of John T.	
	Burns	\$21.50

DENNIS KERWIN.

July 13.	For 10 lbs. insect powder	\$2.50
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E. LEVEEN.

May 1.	For 48 coats, \$20 ; 11 vests, \$2.75 ; 36	
	bows, \$1.08 ; 4 prs. gloves, \$1	\$24.83

F. D. PUTNAM.

July 28.	For 5½ days' labor, haying	\$8.00
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C. A. CLEAVLAND.

July 28.	For 6½ days' haying	\$9.75
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J. S. HOLT & CO.

1889.

Nov. 2.	For 200 gals. soft soap, \$12.50 ;	
	box hard soap, \$4	\$16.50

1890.

Dec. 22.	160 gals. soap, \$9.99 ; 7	
	boxes soap, \$28.56	38.55

1891.

Jan. 26. For 684 gals. soap, \$42.73; 4½	
boxes soap to June 12	\$60.73
	<hr/>
	115.78
Credit, for bones, tallow, and	
grease	6.93
	<hr/>
	\$108.85

O. D. KNOX & CO.

1891.

July 4. For 1 box Brussels soap	\$6.50
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B. F. BASCOM.

July 24. For drawing coal	\$7.50
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J. L. FOGG.

Aug. 1. For 1,590 lbs. guano	\$24.00
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THOMAS BENWAY.

Aug. 23. For 12½ days' labor, haying	\$19.00
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H. DUDLEY.

Aug. 22. For repairing clocks	\$1.85
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JOHN B. JONES.

Sept. 7. For 1 bu. plums	\$2.50
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RICHARDSON MFG. CO.

Sept. 28. For 1 manure spreader	\$125.00
Credit, 1 old spreader	25.00
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	\$100.00

HENRY W. PARKER.

Sept. 23. For 50 bbls. flour, \$300; bag salt, 70c.	\$300.70
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J. E. DAVIS.

July 15. For horse shoeing	\$1.80
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W. A. HOLMES & CO.

Sept. 30. For 50 lbs. coffee, \$15 ; 20½ lbs. tea, \$6.15 \$21.15

J. R. FERSON.

Sept. 10. For 1 democrat wagon \$100.00

JOHN E. TOWLE & CO.

April 27. For 100 lbs. ham \$10.00

R. M. ROLLINS & SON.

For parts of haying machines and repairs . \$8.65

H. N. BARNARD.

Sept. 12. For 47 cords wood \$129.25

L. M. ALDRICH.

1891.

Aug. 27. For labor on water-closets \$15.57

J. ALBERT WALKER.

For 52½³⁶₂₄₀ tons coal in July, Aug., and

Sept. \$214.02

MANCHESTER PROVISION CO.

Sept. 22. For 1 bbl. salt pork \$16.00

G. W. INGALLS & CO.

Sept. 12. For 51 prs. shoes \$32.30

I. C. MERRILL.

Sept. 12. For 453 lbs. beef \$22.65

LIST OF INCIDENTAL EXPENSES FROM OCTOBER
1, 1890, TO OCTOBER 1, 1891.

1890.

Oct.	2.	Expenses to Rochester	\$7.60
	11.	L. M. Aldrich, for filing saws . . . . .	.80
	16.	Expenses to Hillsborough, about cattle	5.75
	20.	Expenses to Concord . . . . .	.75
	23.	Expenses to Deering, about cattle	2.50
	27.	The Globe Store, for moulding board and rolling pin . . . . .	.65
	30.	D. S. Kimball, for carriage repairs . . . . .	.25
Nov.	3.	Dr. J. Alexander, for medicine	1.00
		H. Longa, for arresting boy	2.00
	7.	Perry, Mason & Co., for Youth's Com- panion	1.75
	10.	Expenses to Deering pasture	1.75
	15.	Expenses after cattle	3.75
		H. L. Hall & Co., for repairing watch- man's watch . . . . .	.50
	22.	Expenses to Weare and Deering	2.00
	28.	Commercial Business Exchange	1.00
		Expenses to Portsmouth and Lawrence	5.75
Dec.	23.	Christmas trees . . . . .	.75
	24.	Variety Store, for 6 dust-pans and 6 candle- sticks . . . . .	.80
	27.	Expenses to Goffstown . . . . .	.70
	31.	J. Orrill, for sharpening razors . . . . .	.50
		A. Hovey, for bellows . . . . .	.45
		Filing saws . . . . .	.15
		Inmates' car fares during quarter	13.20
		Extra work and money during quarter	10.05
		Postage stamps	16.60

1891.

Jan.]	6.	Weighing hay . . . . .	.20
	10.	Expenses to Warner	2.58

Jan.	10.	James Orrill, for cutting boy's hair . . .	\$0.25
	17.	W. P. Goodman, for box of pens . . .	1.00
	19.	Expenses to Boston	4.50
		Moor & Preston, for weighing hay . . .	.40
	21.	Expenses to Newmarket	2.12
		T. J. Murdough, for veterinary services .	3.00
Feb.	3.	Expenses to Boston	3.10
		Umbrella . . . . .	.75
	6.	Expenses to Concord	1.25
	9.	Telegraphing . . . . .	.50
		J. Orrill, for honing razor . . . . .	.22
	11.	Expenses to Concord	1.50
	14.	Expenses to Lebanon	4.50
	25.	Expenses to Concord	1.50
		Umbrella	1.00
Mar.	6.	Expenses to Weare	1.30
	9.	Expenses to East Concord	3.22
		6 tickets, to King's lecture	1.50
	12.	Mileage ticket	20.00
	13.	C. P. Trickey, for harmonica . . . . .	.25
		Expenses to Merrimack	1.75
		Baiting horse . . . . .	.40
	14.	Expenses to Concord	1.10
	19.	Expenses to East Kingston	3.60
Mar.	22.	J. B. Sanborn, for driving cattle . . .	2.00
	31.	William Bailey, for weighing hay . . .	.80
		Inmates' car fares during quarter . . .	6.15
		Extra work and money during quarter .	10.25
		Postage stamps	12.00
April	11.	Expenses to Boston	4.00
	18.	L. M. Aldrich, for filing saws . . . .	.50
	20.	1 doz. machine needles . . . . .	.65
	22.	Saturday Telegram for one year	2.00
May	2.	Getting cattle to pasture	3.00
	6.	Expenses to Boston	7.40
	11.	Expenses after boys	16.80

May	20.	Expenses to Gilmanton	\$5.75
	30.	Mending wagon . . . . .	.25
June	1.	Envelopes	1.25
	3.	Expenses to Henniker	3.60
	6.	Expenses to Lake Village	2.60
	9.	Expenses to Gonic, Dover, Portsmouth, and Boston	12.00
	24.	Tickets for boys to Barnum's	17.50
		Inmates car fares during quarter	22.45
		Extra work and money during quarter	18.80
		Postage stamps and cards during quarter	18.19
July	2.	Expenses to Boston	3.75
	3.	Daniel Annis, for cakes . . . . .	.98
	6.	L. Fox, for shoeing horse . . . . .	.70
		H. H. Harriman, for pick-ax handles	1.00
	14.	Expenses to Dover and Portsmouth	4.45
Aug.	13.	Horse keeping . . . . .	.45
	21.	Expenses to Epping	1.50
	22.	E. Colburn, for watermelon . . . . .	.50
		Expenses to Laconia	7.25
		Horse keeping . . . . .	.40
	26.	Dr. I. E. Stanhope, for horse medicine	2.00
	30.	Shoeing horse . . . . .	.50
		J. B. Sanborn, for halters	2.00
Sept.	5.	Expenses to Keene and Boston	9.00
	16.	Boys' expenses to Grange fair at Tilton	6.00
		Basket of peaches	1.25
	19.	Expenses to Alton, for boy	8.50
	21.	12 flower pots . . . . .	.70
	28.	Expenses to Boston	3.00
	30.	Women's Temp. Pub. Co., for catechisms	3.50
		Inmates car fares during quarter	12.65
		Extra work and money during quarter	9.25
		Postage stamps and cards	13.50

SALARIES AND WAGES FROM OCTOBER 1, 1890,
TO OCTOBER 1, 1892.

Paid superintendent and treasurer	\$1,400.00
matron	600.00
principal teacher	352.00
assistant teachers	145.25
farmer	547.50
overseer in chair shop	260.00
overseer in boys' cookroom	365.00
overseer in sewing-room	208.00
overseer in laundry	208.00
housekeeper	237.63
watchman	368.84
assistant farmer	314.50
book-keeper	100.00
	<hr/>
	\$5,106.72

CONDENSED FINANCIAL STATEMENT OF THE
TREASURER.

Cash balance in hands of treasurer October 1, 1890 \$3,060.88

CASH RECEIVED.

From state treasurer	\$6,000.00
For board	8,802.60
chairwork	993.86
From Manchester Stocking Co., for labor	2,606.25
state treasurer, appropriation for school desks, cattle, laundry machinery, and sanitary im- provements	4,000.00
James McKean Wilkins fund	365.00
Moody Kent fund	145.87

From Miss Louise Penhallow fund	\$45.18	
Ex-Gov. Frederick Smyth memorial fund	18.00	
sale of hay	674.55	
Manchester, for labor on highway	199.25	
various sources	645.19	
	<hr/>	\$24,495.75
		<hr/>
		\$27,556.63

CASH PAID.

For ordinary expenses	\$14,379.44	
salaries	5,106.72	
cattle	1,058.00	
water-closets in boys' yard	1,200.00	
laundry machinery	1,000.00	
desks	308.00	
library books from Miss Louise Penhallow fund	45.18	
Ex-Gov. Frederick Smyth memorial prizes	18.00	
insurance	135.00	
improvements	1,770.00	
	<hr/>	\$25,020.34
		<hr/>
Cash balance October 1, 1891		\$2,536.29

BILLS RECEIVABLE.

For board	\$1,869.00	
chairwork	487.00	
hay	164.00	
From various sources	125.00	
	<hr/>	\$2,645.00
		<hr/>
		\$5,181.29
Bills payable		200.00
		<hr/>
Available balance October 1, 1891		\$4,981.29

J. C. RAY, *Treasurer.*

Our school is smaller than for several years, numbering at the present time ninety-three.

For many years in succession we reported that the school had been exempt from sickness and death, but the past year has been an exception. During last fall and winter we had many cases of la grippe, and several of pneumonia, two of which terminated fatally: Noel Davis of Ossipee, and John Thomas Burns of Manchester.

The conduct of the children generally has been very commendable; they have made excellent progress in their studies, and as a whole, have been contented and happy.

In the eighteen years which we have been connected with the school, no serious trouble has ever occurred by the way of a revolt or assault on our teachers or officers. Last August our night watchman, Mr. Clough, was assaulted in the dormitory by two desperate boys, or young men, the leader, Tobin, being about twenty, and Willis about eighteen; Tobin had served time in the Westborough Reform School, escaping from there he tramped the country for a year or more; he was convicted and sentenced here for breaking and entering two years ago, during his minority, having an alternate state prison sentence of three years. Willis had also an alternate prison sentence of three years. For the assault they were brought before the police court of this city and bound over to the supreme court held in Nashua, last September; they were both indicted for assault, with intent to kill; the petit jury failed to sustain the action of the grand jury on the ground that in their belief the boys did not design to kill Mr. Clough, but simply wished to disable him so that they might take his keys and escape.

Since this trouble we have had but three or four commitments, which we think may be attributed to the impression that may so generally now prevail, that our school may be largely made up of this class of boys, and consequently influencing our courts not to sentence to our institution boys who are arrested for truancy or petty larceny. The fact is, that nearly all our inmates are well disposed, and yield a cheerful obedience to our rules and regula-

tions. At the expiration of the sentences of Willis and Tobin at our county jail, they will be immediately taken to state prison to serve their alternate sentences.

In nearly all my reports to the Legislature, I have urged the importance of an appropriation that would enable us to have our school graded, so that we might have our younger and best boys entirely separated from the older and more hardened. It would require additional rooms, and several more officers and teachers, but we think the additional expense would be money well expended.

We have carried on the past year the same industries as for several years past, our hosiery department being the leading industry; quite a number of the smaller lads are engaged in chair seating. The returns from this latter labor of the boys are very small, and the benefits derived from the work as a trade are not of the slightest consequence.

Our farm has yielded bountifully all kinds of crops, as you will notice by referring to the table of farm products. As you will remember, we had the great misfortune to lose our entire herd of forty-two Durham cattle by tuberculosis, a year ago last September. At our suggestion and request, the last Legislature kindly voted an appropriation sufficiently large to cover the loss as per appraisal, with which we purchased a very fine herd of Devon cattle of undoubted pedigree; we have at present about the number we lost, all in excellent condition and apparently free from disease.

The same Legislature cheerfully voted us an appropriation of twenty-five hundred dollars (\$2,500) for the following purposes: School furniture, three hundred dollars (\$300); laundry and dry room, one thousand dollars (\$1,000); water-closet and room, sewerage and heating for same, thirteen hundred dollars (\$1,300); supply tanks and water for same, two hundred dollars (\$200); making in all, about twenty-eight hundred, over-running our appropriation about three hundred dollars (\$300), which we provided from our regular income.

Our buildings are in quite good condition, and kept well

insured. Our boilers are carefully examined externally and internally by an expert, who is sent for this purpose by the Hartford Steam Boiler Inspection and Insurance Company; since the sad and lamentable accident which recently occurred in the Amoskeag Company's yard, I have felt as though our boilers should be removed from their present position, which is directly under the room where most of the children are employed; should an explosion take place the loss of life might be fearful.

A small appropriation would enable us to place them in a comparatively safe position, as far as the lives of so many children are involved.

One other needed change is very much desired. Since the substitution of modern water-closets for the abandoned earth closets, we have had no place in rainy weather for our boys to play. By the expenditure of a few hundred dollars, not exceeding six hundred (\$600), we could build an additional story to our long work-shop, which could be conveniently reached directly from our schoolroom. This room could be furnished with a gymnasium on a small scale, which would contribute much to the health and happiness of the unfortunate children who have so very few opportunities and privileges compared to children in the outside world.

Our religious Sunday services have been conducted by the Woman's Christian Temperance Union, as usual. We pay them annually one hundred and fifty dollars (\$150), for this service, rendered from our regular income. The different clergymen of the city, as well as laymen, have kindly volunteered their services gratuitously for the benefit of the children and the Temperance Union. We trust their labors may result in much good.

The children of the Catholic faith have been instructed monthly by Father Macky, who volunteers his services; we trust his teachings may be greatly blessed.

Mrs. Nathaniel White has kindly remembered the children for many years by gifts of books for our library, and at Christmas time with a box of oranges and one of candy; we extend thanks in behalf of the boys and girls who enjoyed and appreciated her great thoughtfulness.

The legacy of Miss Louise Penhallow of Portsmouth, amounting to one thousand dollars, remains in the savings bank, the income of which is annually expended in enlarging our library.

Again we thank the publishers of the following papers they have gratuitously furnished the children for many years: "Dover Enquirer," "Cheshire Republican," "New Hampshire People and Patriot," "Portsmouth Journal," "Merrimack Journal," "Morning Star," "Our Dumb Animals," "Howard Times," "The Advocate," "The Lyman School Enterprise," twenty copies of "Every Other Sunday," and numerous tracts and books from the International Tract Society. This reading matter has contributed much happiness to our children, and served to do away with many a weary hour.

The fund of Ex-Governor Smyth, amounting to five hundred dollars (\$500), is deposited in the savings bank, the income of which is yearly expended for prize books for our deserving children at our annual examination. Many thanks in behalf of our boys and girls, who highly appreciate his great kindness.

The James McKean Wilkins and Moody Kent funds are safely deposited, and the incomes expended agreeably to provisions of their wills.

To our teachers and officers we renew our thanks for your faithful services during the many years that you have been engaged with me in reformatory work.

To the Honorable Board of Trustees: For more than seventeen years I have acted as superintendent of the school, and in all this long period of time our relations, as far as I know, have been of the pleasantest nature. Your kindness is highly appreciated. That the school may be continued in prosperity is my fervent desire.

J. C. RAY, *Superintendent.*

OCTOBER 1, 1891.

REPORT
OF THE
FISH AND GAME COMMISSIONERS
OF
NEW HAMPSHIRE
TO THE
GOVERNOR AND COUNCIL,
DECEMBER, 1891.

VOLUME I. . . . PART II.

CONCORD:
IRA C. EVANS, PUBLIC PRINTER.
1892.

FISH AND GAME COMMISSION REPORT.

To His Excellency the Governor and his Honorable Council:

The Commissioners of Fish and Game submit the annual report of their official operations for the year ending December 1, 1891 :

The year has been the most successful one since the formation of the commission. A larger number of young fry have been placed in the waters of the State than ever before, owing to the better knowledge obtained by practical experience, with the increased facilities in procuring eggs from our own waters ; and the very fine weather during the month of October, the time the trout and salmon species are taken from the spawning beds. The brook trout fishing has been very good from the large distribution of young fry to the many trout brooks within the past three years, an abundance of water, and plenty of food. We fear, however, that many have perished during the sharp drought of September and October of this year. Many large streams were reported nearly dry, especially in the western part of the State. The State has over three hundred and fifty thousand acres of water within its boundaries. It is not expected that all of these waters can be successfully restocked in a few years, nor is it practical economy to attempt it. It became necessary to carefully examine the various waters to ascertain and determine what

varieties of fish are best adapted to the size of the water area; depth; formation of bottom—sandy, rocky, or muddy; water supply—either by brooks or springs; and the amount of food that can be relied upon to sustain the plant of young fry. It is as necessary to the successful growth of fish to furnish proper sustenance, as it is for the farmer to supply food for his horses or cattle. After a careful examination of some of the large lakes, the commission found the conditions of Sunapee lake, Newbury, and Newfound lake at Bristol better adapted to success than many others. Hatching houses were erected and good results have attended their labors. Hundreds of spawners have been taken from the beds, producing a large number of eggs, the fry of which have been used to restock these lakes abundantly, and large numbers have been transferred to other suitable waters of the State. The expense of procuring the eggs has been very small in comparison to the cost of purchasing them as heretofore. These two lakes furnish an abundance of smelt for food to the adult fish; consequently, the growth is rapid. Land-locked salmon and lake trout have been secured, weighing from twelve to eighteen pounds each. Hundreds have been taken. We believe there is no better fishing in New England than can be found in Sunapee and Newfound lakes. Inhabitants residing on the borders of these waters have rendered great assistance in stopping the unlawful practice of taking fish from the spawning beds, which has been of great service in restocking these waters.

WHITE PERCH

Have been introduced into several of the smaller lakes and ponds within the past four years and have been cared for. The commission have secured the control of

Nutt's pond in Manchester, containing some twenty acres of water, which is peculiarly adapted to the propagation and growth of this valuable variety of fish, heretofore unknown to New Hampshire waters. The planting of several hundred of adult fish has proved a success, and we expect to be able to furnish many hundreds to suitable ponds adapted to their growth, during the coming spring. They are spring spawners and are a very fine pan fish.

LAMPREY EELS.

Not so many as usual were seen at Amoskeag falls last spring, although many more passed up the fishway at Lawrence and Lowell than ever before. In October and November, thousands of young lampreys from four to seven inches in length were seen in the river and canals at Manchester.

ALEWIVES.

The attention of the commission has been called to the preservation and protection of this valuable fish, which annually ascends the river from Great bay to cast their spawn in fresh water. They can go no further up the river than Exeter, on account of the dam at that place. Many are destroyed in the basin below the dam. If a suitable fishway was placed in the dam, they could ascend the river several miles and find suitable spawning beds in fresh water. Consequently, there would be a greater increase each year and the alewife fishery become very valuable. There are several wiers in the river between Exeter and Portsmouth. The alewife fishery has been quite valuable in former years, several thousand dollars worth having been sold. This amount can be greatly increased by suitable protection

and the erection of a suitable fishway at Exeter so they can pass up the river. The cost of the fishway would be small.

The expenses of the commission have somewhat increased in the past two years by the erection of five new and additional hatcheries in Sunapee, Newfound, Laconia, Keene, and Colebrook. The care of them, also the expense of procuring eggs from the adjacent waters to supply them, have added considerable to the expense, as it is necessary to keep at each station additional help with boats and nets to secure the spawners when they go upon the spawning beds, which is from twelve to eighteen days in the month of October. If not secured then, they cannot be taken at all. The large number of eggs procured are of great value in restocking some of the barren waters, and has well repaid the extra outlay.

The expense of executing the laws in the closed season against poachers has been kept within reasonable bounds. A large portion of the fines received have been applied to the expense of prosecution.

SQUAM LAKE.

Many complaints have been made of illegal fishing at Squam lake in past years. This fine sheet of water has become depleted to a large extent by spearing on the spawning beds. An appropriation of \$600 was voted by the last Legislature for a hatchery at Ashland, which has not been built on account of the lateness of the season. A large plant will be made in the spring from other hatcheries. The waters are inhabited by "yellow perch," who are not friendly, but great destroyers of the trout and salmon family. The only way to succeed in restocking is to introduce the black bass, who will eventually destroy the perch and place the waters in

suitable condition to receive trout and salmon, to which the waters are well adapted, especially for land-locked salmon.

UNIFORM GAME LAWS.

At the last session of the Legislature of Massachusetts a resolution was passed directing the Commissioner on Inland Fisheries and Game to call a meeting of all the New England Commissions to discuss the matter of uniform laws on fish and game for all the New England States. The meeting was held in Boston, November 24. Every State was represented, and the subject was fully discussed. There are many obstacles in the way of accomplishing this, owing to the difference in latitude, as May 1 for the end of the closed season for brook trout in Vermont, New Hampshire, and Maine is as early as April 1 is for Massachusetts, Rhode Island, and Connecticut. But there are many laws that might be made uniform for all of these States and would be the means of doing a great amount of good. It is to be hoped that this matter will be followed up, until, as far as possible, our game and fish laws are made uniform.

The number of trout taken in Lake Winnepesaukee the past year is much larger than for many years. This is true not only of the spring fishing but the winter fishing as well. This is no doubt owing to the plants made three and four years ago, and to the better observance of the law in regard to spearing and netting the trout on their spawning grounds. There have been complaints made of the illegal killing of fish in some parts of the lake, more particularly in the vicinity of Moultonborough, Wolfeborough, and Saint's Rest. But taking the lake as a whole, there has been far less of this wanton

destruction than usual. To effectually patrol and guard this large body of water would require an expenditure so large that the commissioners cannot incur it without special instructions from the governor and council.

REPORT OF SUPERINTENDENT.

PLYMOUTH STATION.

The run of salmon in the Merrimack this season was the largest known since the work of restocking the river began. This was not due to high water, but to the large plants made in 1887-8. Seventy-five salmon were taken and placed in the reservoir pond at the hatchery. In size they were below the average for this river, although some of them were very large, from twenty to thirty pounds in weight. Several salmon are reported as having been taken with hook and line from the river below Manchester.

Twelve hundred and fifty-one small, wild trout have been added to the stock of breeding trout in the ponds.

As the average life of the brook trout in confinement is only eight or nine years, it requires constant attention to keep the number up to the capacity of the breeding ponds.

This addition of twelve hundred and fifty-one was purchased with money received from the sale of large male trout that were no longer needed at the station. A serious loss of eggs occurred this season from the spawning of many of the large trout in July and August, as no ripe males could be found until the first week in September, and then the milt was not fully developed. Not over fifty per cent of the eggs treated with it were fertilized.

January 19, I received ten thousand eggs of the California trout. These were sent from the Wytheville, Virginia, station of the United States Fish Commission.

February 20, one hundred and thirty-two thousand eggs of the Penobscot salmon—*salmo salar*—were received in good condition. These were purchased by the State of Massachusetts, at an expense of several hundred dollars.

January 26, ten thousand eggs of the Loch Leven trout were received from the United States fish hatchery at Northville, Michigan.

This lot was transferred to the Sunapee hatchery:

March 6, there was received from Grand Lake stream, Maine, fifty thousand eggs of the land-locked salmon. All of the above eggs, except the Penobscot salmon, were donated to New Hampshire by the United States fish commissioner, Col. M. McDonald. The distribution of young fry began March 17. Twelve thousand brook trout fry were planted in Whitcomb Mountain pond in Odell. They were carried ten miles into the woods, over logging roads, without loss. This is a cold, clear, spring pond, from one to ten feet deep, and from fifty to sixty acres in area, with no fish of any kind in it until this plant was made.

The distribution of young fry to the various towns for 1891 is as follows:

BROOK TROUT.

APPLICANT.

Odell . . .	12,000	J. W. Welch and others.
Berlin Falls*	10,000	H. I. Goss “
Greenfield . .	5,000	F. W. Dunklee “
Keene and vicinity	20,000	C. F. Rowell “

* Applicants did not meet young fry when notified.

Jaffrey . . .	10,000	Jonas Cutler and others.
Fitzwilliam . .	5,000	P. S. Batchelder “
Marlborough . .	5,000	C. A. Bemis “
Chesham . . .	5,000	F. D. Bemis “
Roxbury . . .	5,000	W. Lawrence “
Munsonville . .	5,000	Frank Foster “
Troy . . .	5,000	Charles Haskell “
Hancock . . .	10,000	Eugene Wason “
Goshen . . .	5,000	E. H. Carr “
Concord . . .	10,000	John P. George “
Fabyan's . . .	5,000	Oscar Barron “
Crawford's . . .	5,000	Merrill “
Wilton . . .	10,000	R. M. Moore.
Dunbarton . . .	5,000	Elmer Ordway.
Kensington . . .	5,000	J. W. Brown.
Durham . . .	10,000	F. A. Cristie and others.
Madbury . . .	5,000	“ “
Dover . . .	5,000	“ “
Lee . . .	5,000	“ “
Pittsfield . . .	20,000	N. S. Drake “
Salmon Falls* . .	5,000	E. A. Stevens “
Hooksett . . .	6,000	F. C. Towle “
Temple . . .	5,000	Jacob Kendall “
New Ipswich . .	10,000	Hubbard “
Derry . . .	5,000	G. F. Prescott “
Manchester and vic'y	25,000	G. W. Riddle “
Bedford . . .	5,000	“ “
Goffstown . . .	5,000	“ “
Brentwood . . .	5,000	William Morrill “
Hampton . . .	5,000	R. W. DeLancy “
Barrington . . .	10,000	W. B. Swain “
Epsom . . .	5,000	J. A. Doe “
Portsmouth . . .	10,000	Stephen Decatur “

* Applicants did not meet young fry when notified.

Laconia . . .	5,000	J. T. Busiel and others.
Kingston . . .	5,000	F. W. Ingalls "
Nashua . . .	10,000	J. M. Woodward "
Brookline . . .	5,000	J. H. S. Tucker "
Rollinsford . . .	5,000	D. S. Ward "
Exeter . . .	10,000	J. Warren Towle "
Northwood* . . .	10,000	A. J. Fogg "
Canaan . . .	5,000	E. Smith "
Ellsworth . . .	5,000	F. P. Holt "
Enfield . . .	5,000	H. J. Cole "
Lebanon . . .	10,000	N. W. Morse "
Plainfield . . .	5,000	Fred Moulton "
Warner . . .	10,000	E. H. Carroll "
Bennington . . .	5,000	A. W. Grey "
Claremont . . .	15,000	W. M. Smith "
Concord . . .	10,000	H. Chadwick "
Penacook . . .	5,000	J. I. Hoyt "
Lancaster . . .	10,000	H. F. Whitcomb "
Washington . . .	5,000	F. P. Newman "
Orford . . .	10,000	Paul Lang "
Jackson . . .	10,000	G. P. Trickey "
Lisbon . . .	10,000	W. K. Parker "
Littleton . . .	20,000	C. C. Smith "
Boscawen . . .	10,000	W. H. Sargent "
Sandwich . . .	5,000	W. F. Langdon "
Franconia* . . .	10,000	H. W. Priest "
Canterbury . . .	5,000	C. E. Morrill "
Grafton . . .	10,000	G. M. Sulloway "
Weare . . .	10,000	E. C. Gove "
Francestown . . .	5,000	G. K. Wood "
Campton . . .	5,000	
Total . . .	548,000	

* Applicants did not meet young fry when notified.

LAND-LOCKED SALMON.

Webster lake . .	30,000	Walter Aiken.
Stinson pond . .	10,000	F. P. Holt.
Lake Winnepesaukee	25,000	Frank Busiel.
Newfound lake . .	25,000	
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Total . . .	90,000	

PENOBSCOT SALMON.

Pemigewasset river	332,000
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CALIFORNIA TROUT.

Perch pond, Campton	10,000
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TOTAL DISTRIBUTION FROM PLYMOUTH STATION.

Brook trout	548,000
Penobscot salmon	332,000
Land-locked salmon	90,000
California trout	10,000
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Total	980,000

TRANSFERRED TO SUNAPEE STATION.

Loch Leven trout	10,000
California trout	10,000
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Total	20,000
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Total handled at Plymouth station . .	1,000,000

DISTRIBUTED FROM BRISTOL STATION.—LAKE TROUT.

Newfound lake	500,000
Webster lake, Franklin	25,000
Mascoma lake, Enfield	10,000
East pond, Enfield	15,000
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Total	550,000

DISTRIBUTED FROM LACONIA STATION.—LAKE TROUT.

Winnesquam bay	260,000
Lake Winnepesaukee	420,000
Penacook lake	10,000
Walker's pond, Boscawen	10,000
Stinson pond, Rumney	10,000
Total	<u>710,000</u>

TRANSFERRED TO KEENE STATION.

Lake trout	50,000
Total handled at Laconia station	<u>760,000</u>

DISTRIBUTED FROM SUNAPEE STATION.—BROOK TROUT.

Sunapee lake	65,000
Newbury, Beach brook	3,000
	<u>68,000</u>

AUREOLUS, OR GOLDEN TROUT.

Sunapee lake	70,000
Pleasant pond, New London	5,000
	<u>75,000</u>

LAND-LOCKED SALMON.

Sunapee lake	65,000
Pleasant pond, New London	10,000
	<u>75,000</u>
Loch Leven trout	10,000
California trout	10,000
Total	<u>238,000</u>

KEENE STATION.

Lake trout, Chesterfield lake	50,000
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TOTAL DISTRIBUTION.

Brook trout	616,000
Lake trout	1,310,000
Penobscot salmon	332,000
Land-locked salmon	165,000
Aureolus, or Golden trout	75,000
California trout	20,000
Loch Leven trout	10,000
	<hr/>
	2,538,000

There are now laid down in the hatchery over half a million brook-trout eggs, two hundred and ten thousand lake-trout eggs, two hundred thousand Penobscot salmon, and seventy-five thousand land-locked salmon eggs. Fifty-five thousand of these eggs were secured at the head of Newfound lake, and thirty thousand at Squam lake. These eggs have been secured at less than one half what they would have cost had we purchased them in Maine, and the money has been paid to our own citizens. The run of salmon in the river at the head of Newfound lake was not as large as expected, most likely owing to the unusually low water in October. Large numbers were seen about the mouth of the river, and as they did not go up to their spawning grounds in the river, they must have deposited their eggs on some of the shoals in the lake. Arrangements will be made to take a much larger number of eggs at Squam lake another season.

SUNAPEE LAKE STATION.

The work of securing the fish to stock the hatchery was under the charge of R. N. Sargent. The first brook trout were taken September 13. The large in-

crease in the number of these trout taken this year shows the effect of the heavy plants made the last four years, the number being double that taken last year. Some fine hybrids, a cross between the brook trout and the Aureolus, were taken. The specimens taken were fertile, showing a close relationship between the two fish.

Owing to the unusually low water, no salmon could find their way into the brook, and not as many females could be secured as were taken last year. The Aureolus came on their spawning beds in October in large numbers, and many more were secured than were taken last year. Hybrids were also taken with the Aureolus, showing that while some of them follow the instinct of the brook trout, and seek running water for the purpose of reproducing their species, others retain the habits of the Aureolus, and resort to the shallow reefs in mid-lake for the purpose of spawning.

During the past year this peculiar trout has been found in one lake or pond in Maine, where it has been known to exist for at least sixty years. This fact puts a quietus on the very thin theory that has been advanced by some writers on this fish—that it is “a recent introduction from Europe.” The fishing in this lake the past season has been fully up to the average. The number of brook trout taken was much larger than last year. The salmon fishing was good, the average weight being about ten pounds.

The new law prohibiting the taking of trout less than ten inches in length has been well observed. The returning alive to the lake of hundreds, and, in fact, thousands of fingerling trout from five to eight inches, will have a good effect upon the fishing in the years to come.

There are now laid down in the hatchery 156,000 brook trout, 120,000 Aureolus, and 44,000 land-locked

salmon eggs. At least 50,000 eggs of the brook trout should be transferred to the Plymouth station for general distribution.

BRISTOL STATION.

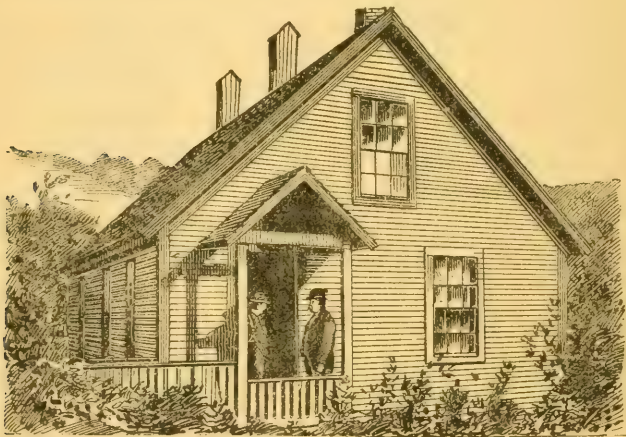
The work at this station was in charge of Mr. George H. Fowler. The first trout taken was October 18, last eggs taken October 30. The fish were unusually plenty on the spawning beds, and averaged much larger than the last two years.

At least two million eggs could have been taken if there had been room in the hatchery to put them. One million and forty thousand eggs were taken. Of these, 830,000 are now in the hatchery at this station, and two hundred and ten thousand in the hatchery at Plymouth. It will be necessary to transfer two or three hundred thousand to Laconia, as there will not be room for them in the hatchery after they are hatched.

LACONIA STATION.

A much larger number of eggs have been secured at this hatchery than last year. There are now four hundred and twenty thousand laid down. These eggs were taken from Winnesquam bay, and the young fry will be nearly all planted there. The plant for Winnepesaukee lake coming from the eggs transferred from the Bristol station, and from one to two hundred thousand eggs from Lake Michigan, kindly donated to New Hampshire by Col. M. McDonald, the United States Commissioner on Fish and Fisheries. Five hundred thousand eggs from Lake Michigan were received at this station January 30. Four hundred and twenty thousand of these were planted in Lake Winnepesaukee. The balance went to different ponds and lakes in the State.

The water in these lakes is lower than has been known for many years, and is many degrees colder. December 17, water in the hatchery was fourteen degrees colder than the same date last year, being thirty-two and one half degrees against forty-six degrees last year. The same difference also is found at the Bristol hatchery. This unusually low temperature will necessitate a large increase in expenses for attendance and wood, as fires will have to be kept up whenever the thermometer falls much below twenty.



KEENE HATCHERY.

KEENE STATION.

This hatchery has been completed and equipped. Fifty thousand lake-trout eggs were hatched and planted in Chesterfield lake. Another season an effort will be made to establish breeding ponds for brook trout, and to place the station in good running order, so that it will be able to furnish a good supply of young trout for this section of the State. This must be done, as the severe drought the past season has ruined many of the best

trout streams, and it will take a large number of young fry to bring them back to their former state.

COLEBROOK STATION.

At the last session of the Legislature, an appropriation of one thousand dollars was made for the purpose of building and equipping a fish hatchery at Colebrook. The order for building the hatchery was not given until September 23. Before the building could be completed the best time for securing trout eggs had passed. Only forty thousand eggs were secured, and these are now in the hatchery. A fine location was secured for the station, with an abundance of pure spring water. There is ample room and water for making and supplying a breeding pond sufficient to contain a large number of trout. And it would only require a moderate outlay of money to make it one of the largest trout-breeding establishments in New England. Until breeding ponds are established, a fair supply of eggs can be had from the Dimond ponds, if the parent fish are secured in September.

FINANCIAL STATEMENT.

Appropriation for hatchery at Colebrook		\$1,000
Oct. 19	Paid W. F. Keyes . .	\$18.00
19	G. D. Pilbro . .	7.50
19	T. D. Barnett . .	24.00
24	A. C. Wallace . .	31.00
10	S. T. Noyes . .	50.00
13	W. S. Allen & Sons . .	36.00
12	J. L. Rogers . .	19.00
12	D. Stevens & Co. . .	3.00
15	W. Rolfe . . .	4.00
13	J. W. Spencer . .	53.15
15	Colebrook Hardware Co.	117.28

Oct.	15	Paid H. Hammond & Son .	\$55.90	
	15	J. W. Drew & Co. .	14.10	
	15	C. S. Raymond .	12.05	
	10	H. W. Woodrow .	2.50	
	16	D. R. Shattuck .	5.50	
	16	George Hilliard .	5.00	
	16	L. Newman .	13.50	
	16	H. P. Shattuck .	22.00	
	16	F. Covill .	9.37	
	16	Concord & Montreal		
		R. R., freight .	5.90	
	4	Concord & Montreal		
		R. R., freight .	3.30	
	10	F. H. Woodrow .	5.00	
	10	H. Knights .	8.30	
	10	American Express Co.	1.80	
Nov.	7	Morss & Whyte .	23.93	
	7	E. F. Emerson .	60.00	
	7	Pail and rope .	.90	
	7	A. Wheeler .	3.25	
			<hr/>	\$661.53
		Balance		\$338.47
Dec.	23	Paid E. H. Graham .	\$9.85	
	23	J. H. Dudley .	20.48	
	23	M. B. Noyes .	20.00	
		A. C. Wallace .	29.66	
		T. G. Rowan .	8.50	
		W. F. Keyes .	23.75	
		Brewster Bennett .	75	
		Colebrook Hardware Co.	1.73	
			<hr/>	114.72
		Balance		\$223.75

The hatchery is a one-story, wooden building, 22 x 32, well built and painted, with woodshed, and has a capacity for hatching seven hundred and fifty thousand trout.

Expenses at Bristol station for the year ending December 1, 1891 :

Feb. 23	Paid J. R. Sleeper, wood and labor .	\$5.50
June 4	N. Sleeper, labor at hatchery .	53.35
		<hr/>
	Total expense of hatching 550,000 eggs .	\$58.85

Expense of stocking hatchery, 1891 :

Paid Elias Adams	\$12.00
E. T. Pike	26.90
H. O. Pike. . . . 3.65	4.50
C. N. Drake	24.49
George H. Fowler, labor and sundries	47.75
	<hr/>
Total cost of taking 1,040,000 eggs .	\$115.64
	<hr/>
Total expense for the year	\$174.49

Cost of eggs per thousand, eleven and two fifths cents.

SUNAPEE LAKE STATION.

Nov. 13	Paid A. J. Cheney, 46 days' labor .	\$69.00
30	S. E. Bickford, 36 days' labor .	36.00
30	R. N. Sargent, 77 days' labor .	154.00
27	Morrison & Searles, camp sup- plies	5.17

LACONIA STATION.

June 13	Paid C. J. Gould, cans	\$24.00
Nov. 30	O. H. Daniels, labor at hatchery	50.00
	Cleaning hatchery	1.50
	Express on black varnish . . . .	.45
	Varnishing hatching troughs	2.87
	Strap hinge . . . .	.20
	One fourth cord wood	1.25
	Express on trays . . . .	.25
	Labor on supply tank and pipe	5.00
		<hr/>
		\$85.52

Expense of stocking hatchery with 420,000 eggs:

Paid lumber for fish car	\$6.44
H. Meserve, 17½ days' labor	21.87
C. Judkins, 5½ days' labor	8.25
K. Pickering, 2 nights' labor	2.00
D. Parker, 2 nights' labor	3.00
Walter Huse, labor	4.00
Use of boats	19.50
Team	2.50
Camp supplies	21.10
O. H. Daniels, labor	65.00
Torches	1.60
	<hr/>
	155.26
	<hr/>
Total expense	\$240.78

Eggs cost per thousand, thirty-seven cents.

KEENE STATION.

	Balance of appropriation	\$204.84
June 1	Paid C. J. Gould, cans	\$12.00
July 29	E. P. Sebastian, labor and sundries	31.63

Nov. 30	Paid E. P. Sebastian, labor	\$75.00	
30	Henry Griffin, coal .	10.16	
30	Knowlton & Stone, hardware . . .	5.95	
30	Beaver Mills Co., lum- ber	6.22	
30	E. P. Sebastian, labor .	8.00	
		————	\$148.96
			<hr/>
	Balance		\$55.88

PLYMOUTH STATION.

1890.

Dec. 1	Paid E. B. Hodge, superin- tendent	\$108.34	
	D. H. McLinn, assistant	35.50	
	Express charges . . .	5.65	
	H. Mudgett, labor . .	15.33	
	Freight on fish meat .	1.03	
	Burleigh & Adams, insur- ance	7.50	
		————	\$173.35
Feb.	Paid E. B. Hodge, superin- tendent	\$108.34	
	D. H. McLinn, assistant	35.50	
	George Gove, building chimney	3.00	
	H. Sorrell, breaking road	1.25	
	Fish meat	19.26	
	Freight fish meat and cartage	6.93	
	Express on fish eggs .	7.65	
		————	181.93

April	Paid E. B. Hodge, superin-		
	tendent	\$108.34	
	D. H. McLinn, assistant .	40.00	
	W. R. Park, lumber .	12.91	
	Burleigh & Adams, insur-		
	ance	4.00	
	Fish meat and freight .	30.79	
	Express on eggs . .	7.30	
		<hr/>	\$203.34
June 1	Paid E. B. Hodge, superin-		
	tendent	\$108.34	
	D. H. McLinn, assistant	40.00	
1	Fiberwood Co., ground		
	rent	28.00	
	Fish meat	10.00	
	Cartage and freight on		
	fish meat	5.99	
		<hr/>	192.33
Aug.	Paid E. B. Hodge, superin-		
	tendent	\$108.34	
	D. H. McLinn, assistant	40.00	
	C. J. Gould, fish cans .	20.80	
	American Net and Twine		
	Co.	29.63	
	Fish meat	12.50	
		<hr/>	211.27
Oct.	Paid E. B. Hodge, superin-		
	tendent	\$108.34	
	D. H. McLinn, assistant	40.00	
	Fish meat	24.00	
		<hr/>	172.34
		<hr/>	
	Total		\$1,134.56

All necessary repairs have been made, and the station is in good condition.

GAME.

At the last session of the Legislature an appropriation of six hundred dollars was made to employ detectives to prevent the destruction of deer, and other game. This was rendered necessary on account of the great depth of the snow in the northern part of the State, as in many places it was seven feet deep on the level.

This rendered the deer perfectly helpless, and all the weapon required by the poachers was a knife to cut their throats. Before the appropriation was available, a great many deer were killed. Detectives were at once appointed in Coös and Carroll counties. The work required men who could put on their snowshoes, and with blanket, axe, and provisions, tramp for miles through the unbroken forest, camping wherever night overtook them.

The work was kept up until the snow was gone, and the lives of hundreds of deer were saved. After it became known that detectives were appointed, the crust hunters in almost all places stopped their work of killing deer.

As a result of the work accomplished, over twenty poachers were arrested and fined, while several others left the State, and have not yet returned.

If the lumber companies would prohibit the men from keeping dogs in their camps, it would save a great many deer, as they are allowed to run loose, and as the deer are helpless in the deep snow, they are easily caught and torn to pieces by them. Considering the large number of deer saved and the bringing to justice of so many of the poachers, it was money well expended by the State.

There has not been a time for at least forty years

when the deer have been so plenty in the State as they are at present. There are but few moose and caribou now left, yet the moose seem to be on the increase.

FINANCIAL STATEMENT OF EXPENSES.

Appropriation	\$600.00
Expenses of detectives	314.10
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Balance	\$285.90

E. B. HODGE,
Superintendent.

PLYMOUTH, December 1, 1891.

RAILROADS.

Thanks are due to the Concord & Montreal, Boston & Maine, and Maine Central railroads for favors received in the free transportation of young fish over their respective lines.

Respectfully submitted,

GEORGE W. RIDDLE,
ELLIOTT B. HODGE,
WILLARD H. GRIFFIN,
Fish and Game Commission.

MANCHESTER, December 1, 1891.

APPENDIX.

APPENDIX.

To the Fish and Game Commissioners:

GENTLEMEN,—The enforcement of the fish and game laws of the State is a work that requires time, patience, and considerable money. This year more complaints have been sent me than in any previous season. I have attended to all that have come in, and a lengthy list of prosecutions have been made, resulting in the conviction of all the parties brought before the courts. The judges and officers of the courts, without exception, have shown a willingness to sustain the laws, and persons, after paying a fine, have acknowledged that it was right to enforce the law, and many citizens have expressed their views, by saying they were glad something was being done to stop the wholesale slaughter of our fish and game, especially in the breeding season. The following is a list of those who have been before the courts:

May 5	A. J. Brown, of Exeter,	fined \$20 and costs.		
June 11	Joseph Halaire, of New-			
	market	" 20	"	
11	Peter Vallair, of New-			
	market	" 20	"	
12	Nathan T. Batchelder, of			
	Exeter	" 30	"	
24	C. R. Foss, of Dover .	" 20	"	
24	O. L. Churbuck, of Dover	" 20	"	

June 27	David and Sewall Bassett, of Newmarket . . .	fined \$100 and costs.
July 3	Samuel R. Peavey, of Exeter	“ 20 “
21	Edward Amazeen, of Newcastle	“ 20 “
27	Levi Blake, of Hampton .	“ 120 “
28	Frank Nudd, of Hampton	“ 100 “
29	Jason Lamprey, of Hamp- ton	“ 10 “
Aug. 4	Josiah Hayley, of Rye .	“ 30 “
14	Levi Blake, of Hampton .	“ 100 “
22	Samuel Harbolt, of Hamp- ton	“ 20 “
28	Horace Mace, of Hamp- ton	“ 10 “
Sept. 7	C. Littlefield, of New- market	“ 40 “
8	Joseph A. Hill, of Great Falls	“ 60 “

One half of the fines go to the town or city in which the complaint is made.

Several other parties have been found violating the laws, but their extreme poverty, and ignorance of the law, was such that I have thought proper to excuse them upon a promise to better observe the laws in future. Early in the season my attention was called to violations of the fishing laws in Squamscot river (a tributary of the Piscataqua). The method of fishing on this stream is by use of weirs, and the common sweep seine. The statute forbids the construction of weirs at a distance of less than one mile from each other. I examined the premises, and found eight of these death traps within a distance of four miles. The parties were

notified that the extra number of weirs must be removed. The request was promptly complied with, except in one instance. The offender, in this case, was brought before the court, and was judged to be guilty upon his own statement. His defence was, that the State had no jurisdiction in tidal waters. Had he plead insanity, his chance of escape would have been favorable.

The fisheries on Squamscot river have decreased to the extent that the value of the fish taken annually does not exceed \$4,000. At the present time the fish have no chance to spawn in fresh water. The spawn is deposited where the tide ebbs and flows, and is killed by exposure. By erecting a suitable fishway at the dam at Exeter, which may be done for a small outlay, the fall being only ten feet, and the introduction of shad and salmon to this stream, which has every facility for their cultivation, the value of the fisheries in five years could easily be made to be of six times their present value. The long-continued use of the deadly weir in this river is another element of destruction that has been instrumental in reducing the fisheries to their present low condition. Our coast is lined with them, and they are constructed with a mesh so small that nothing escapes them. The young of nearly all our species of food fish are taken by them, thus it is that millions of young fish are uselessly destroyed, and it is a question in the minds of thinking men whether our fisheries can be restored to their former condition, while so many of these death traps are in use. Their use should certainly be prohibited in all streams in the State, as it is evident their use is directly against the true interest of those who use them. Any method of fishing that destroys a large portion of the young fish, must be abandoned, if we are to succeed in fish culture.

At your request I investigated the matter of complaints of the violations of the fishing laws at the lake, near Wolfeborough. During the months of October and November, it has been the practice to spear the trout as they came upon the spawning grounds, and much damage has been done to the lake fisheries by this method of taking fish. There was not so much of this destructive work done this year as in previous seasons, as the parties who have been active in this business were notified that the law would be enforced. This, in some measure, checked the business, but the distance to guard is more than one person can properly look after, and I would suggest that an additional force be employed for six weeks, during the time the fish are on the spawning beds.

This business of killing trout while on the spawning grounds does more injury to our lake fisheries than does the taking by hook and line of all the fish caught. The subject is an important one, and I trust your honorable board will take active measures to further protect the fisheries in the spawning season.

B. P. CHADWICK,
Detective, State of New Hampshire.

LIST OF FISH COMMISSIONERS OF UNITED STATES AND CANADA.

THE UNITED STATES.

Col. Marshall MacDonald, commissioner, Washington, D. C.
Capt. J. W. Collins, assistant in charge of fisheries division.
Richard Ratburn, assistant in charge of scientific inquiry.
George H. H. Moore, superintendent of distribution.
T. H. Bean, ichthyologist and editor.
I. I. O'Connor, chief clerk.
John Gay, inspector of stations.

ALABAMA.

Col. D. R. Hundley, Madison.
Hon. Charles S. G. Doster, Prattsville.

ARIZONA.

T. W. Otis, Prescott.
John Howard, Prescott.
C. W. Stearns, Phenix.

ARKANSAS.*

H. H. Rottaken, president, Little Rock.
W. B. Worthen, secretary, Little Rock.
J. W. Calloway, Little Rock.

DOMINION OF CANADA.

Hon. John Tilton, deputy minister of fisheries, Ottawa.

Inspectors of Fisheries for 1891.

W. H. Rogers, Amherst, N. S.
A. C. Bertram, North Sidney, C. B., N. S.

* This State has never made an appropriation for fish culture.

W. H. Vening, St. John, N. B.
William Wakeman, Gaspé Basin, P. Q.
J. H. Duvar, Alberton, P. E. I.
Thomas Mowat, New Westminster, B. C.
Alexander McQueen, Winnipeg, Man.

Officers in Charge of Fish-Breeding Establishments.

S. Wilmot, superintendent of fish culture, Newcastle, Ont.
Charles Wilmot, officer in charge, Newcastle Hatchery, Ont.
William Parker, Sandwich, Ont.
L. N. Catelier, Tadoussac, P. Q.
Philip Vibert, Gaspé, P. Q.
A. H. Moore, Magog, P. Q.
Alexander Mowat, Restigouche, Matapedia, P. Q.
A. B. Wilmot, Bedford, N. S.
C. A. Farquharson, Sidney, N. S.
Isaac Sheasgreen, Miramichi, N. B.
Charles McCluskey, St. John River, Grand Falls, N. B.
Henry Clarke, Dunk River, P. E. I.
Thomas Mowat, B. C. Hatchery, New Westminster, B. C.

CALIFORNIA.

Joseph Routier, Sacramento.
C. M. Joslyn, San Francisco.
J. Downey Harvey, San Francisco.

COLORADO.

Gordon Land, Denver.

CONNECTICUT.

Dr. William M. Hudson, Hartford.
James A. Bill, Lyme.
George C. Waldo, Bridgeport.

DELAWARE.

Charles Schubert, Odessa.
Dr. E. G. Shortedge, Wilmington.

GEORGIA.

J. H. Henderson, Atlanta.
Dr. H. H. Cary, superintendent, La Grange.

ILLINOIS.

N. K. Fairbanks, president, Chicago.

S. P. Bartlett, secretary, Quincy.

George Breuning, Centralia.

INDIANA.

W. T. Dennis, Richmond.

IOWA.

E. D. Carlton, Spirit Lake.

Ole Bjorenson, superintendent.

KANSAS.

S. Fee, Wamego.

KENTUCKY.

William Griffith, president, Louisville.

P. H. Darby, Princeton.

John B. Walker, Madisonville.

Hon. C. J. Walton, Mumfordsville.

Hon. John A. Steele, Midway.

W. C. Price, Danville.

Hon. J. M. Chambers, Independence.

A. H. Goble, Catlettsburg.

J. H. Mallory, Bowling Green.

MAINE.

E. M. Stilwell, Bangor.

Henry O. Stanley, Dixfield.

B. W. Counce, sea and shore fisheries, Thomaston.

MARYLAND.

Dr. E. W. Humphries, Salisbury.

G. W. Delawder, Oakland.

MASSACHUSETTS.

E. A. Brackett, Winchester.

E. H. Lathrop, Springfield.

J. C. Young, Wellfleet.

MICHIGAN.

Herschel Whitaker, Detroit.
Joel C. Parker, M. D., Grand Rapids.
Hoyt Post, Detroit.
Walter D. Marks, superintendent, Paris.
George D. Mussey, secretary, Detroit.
William A. Butler, Jr., treasurer, Detroit.

MINNESOTA.

Robert Ormsby Sweeney, president, St. Paul.
William Bird, Fairmount.
Niles Carpenter, Rushford.
S. S. Watkins, superintendent, Willow Brook, St. Paul.

MISSOURI.

H. M. Garlich, chairman, St. Joseph.
J. L. Smith, Jefferson City.
H. C. West, St. Louis.
A. P. Campbell, secretary, St. Joseph.

Superintendents.

Philip Kopplin, Jr., St. Louis.
Elias Cottrill, St. Joseph.

NEBRASKA.

William L. May, Fremont.
B. E. B. Kennedy, Omaha.
——— McBride, Lincoln.
M. E. O'Brien, superintendent, South Bend.

NEVADA.

George T. Mills, Carson City.

NEW HAMPSHIRE.

George W. Riddle, Manchester.
Elliott B. Hodge, Plymouth.
Willard H. Griffin, Henniker.

Superintendent of Plymouth, Sunapee, Laconia, Bristol, and Colebrook Hatcheries.

Com. E. B. Hodge, Plymouth.

NEW JERSEY.

William Wright, Newark.
Frank M. Ward, Newton.
J. R. Elkinton, Pennsgrove.

NEW YORK.

David G. Hackney, Fort Plain.
William H. Bowman, Rochester.
A. S. Joline, Tottenville.

Secretary.

E. P. Doyle, Room 311, Potter Building, New York City.

Superintendents.

Fred Mather, Cold Spring Harbor.
Monroe A. Green, Caledonia.
James H. Marks, Bloomingdale, Adirondacks.
E. L. Marks, Sacanda.
E. F. Boehm, Mill Creek.

Shellfish Commission.

E. G. Blackford, commissioner, 80 Fulton Market, New York.
William G. Ford, engineer, 80 Fulton Market, New York.
J. W. Merserau, oyster protector, 80 Fulton Market, New York.

NORTH CAROLINA.

No commission.

OHIO.

I. A. Henshaw, president, Cincinnati.
A. C. Williams, secretary, Chagrin Falls.
John Hofer, Bellaire.
John H. Law, Cincinnati.
Hon. Emory D. Potter, Toledo.
Thomas D. McNott, superintendent, Sandusky.
L. K. Buntain, chief warden, Dayton.

OREGON.

F. C. Reed, president, Clackamas.
E. P. Thompson, Portland.
R. C. Campbell, Ranier.

PENNSYLVANIA.

Henry C. Ford, president, 524 Walnut street, Philadelphia.
James V. Long, corresponding secretary, 75 Fifth avenue, Pittsburg.
H. C. Demuth, secretary of board, Lancaster.
S. B. Stilwell, Scranton.
A. S. Dickson, Meadville.
W. L. Powell, treasurer, Harrisburg.
L. Streuber, Erie.

Superintendents.

John P. Creveling, Allentown.

William Butler, Corry.

RHODE ISLAND.

J. M. K. Southwick, Newport.
Henry T. Root, Providence. •
William P. Morton, Johnston.

SOUTH CAROLINA.

Hon. A. P. Butler, Columbia.

TENNESSEE.

W. W. McDowell, Memphis.
H. H. Sneed, Chattanooga.
Edward D. Hicks, Nashville.

UTAH.

A. Milton Musser, Salt Lake City.

VERMONT.

C. C. Warren, Waterbury.
J. A. Titcomb, Rutland.

VIRGINIA.

Dr. J. T. Wilkins, Bridgetown.

WEST VIRGINIA.

C. S. White, president, Rumney.
F. J. Baxter, treasurer, Sutton.
James H. Miller, secretary, Hinton.

WISCONSIN.

The Governor, *ex officio*.
Philo Dunning, president, Madison.
C. L. Valentine, secretary and treasurer, Janesville.
Mark Douglas, Melrose.
A. V. H. Carpenter, Milwaukee.
Calvert Spensley, Mineral Point.
E. S. Miner, Sturgeon Bay.
James Nevin, superintendent, Madison.

WYOMING.

Louis Miller, Laramie.







